

Social Sciences in Professional Education

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WELCOME SPEECH

J.P. Naik

Member-Secretary, Indian Council of Social Science Research

ON BEHALF OF the Indian Council of Social Science Research, and myself, I welcome you all to this Conference on the Role of Social Sciences in Professional Education.

Let me say a few words regarding the genesis and the objectives of the Conference. Most of you may be aware that under the sponsorship of the University Grants Commission (U.G.C.) a conference had been arranged in Delhi in 1969 to discuss the Role of Social Sciences in Medical Education. A group of social scientists felt that the problem needed further examination and approached the Indian Council of Social Science Research for financial support. The Council felt that it would be good to extend the scope of the proposed enquiry and to examine the status of social sciences not only in the field of medicine but also in those of agriculture and engineering. Accordingly, this Joint Study Team was set up with the U.G.C. and with the cooperation of the Indian Council of Medical Research, the Indian Council of Agricultural Research, and the All India Council for Technical Education. The Study Team had done an excellent job and covered a good deal of ground. A stage has, therefore, been reached in its deliberations when it is necessary to place the data collected by it before a representative group of scientists and social scientists and to get their views on several significant issues that have come to the surface. That is the purpose of this Conference, and on the feedback of its deliberations that the Study Team will formulate its conclusions and recommendations.

It is indeed heartening that social sciences have entered agricultural, engineering, and medical education and that a number of social scientists are actively participating in the teaching programmes in professional institutions of higher education. But this is only the first step in a long and arduous

journey. We are not very clear about the precise role of social sciences in these professional areas. The community of social scientists working in agriculture, engineering, and medical institutions is sizable, but it is facing special problems in the different, if not strange, environments of these institutions. The research conducted by the social scientists in these technical fields is quantitatively small and its quality often leaves much to be desired. Above all, we have still not been able to evolve a continuing and meaningful dialogue between the practitioners of social sciences and of the natural and technical sciences. It is obvious that in the context of a developing society such as ours, such a dialogue has a tremendous potential for development.

We have gathered here in this Conference to discuss ideas, to identify problems, and to chalk out a programme of action so that a continuing and fruitful dialogue is established between the social scientists and the men from technical fields, the teaching of social sciences in these professional institutions is improved and research in social sciences, as applied to these special areas, is vigorously promoted. To assist you in your deliberations, the I.C.S.S.R. Secretariat has prepared several documents under the direction of the Study Team. In addition, there are working papers prepared by distinguished scholars who have the experience of working in the settings of technical institutions and who have many ideas to offer. I do hope you will find them of interest as well as of use.

Friends, I welcome you all. We will do our best to see that your stay in Delhi is comfortable. Delhi is too big and it has its own problems of transportation and of a not-very-propitious weather. All these problems notwithstanding, it will be our endeavour to see that you find a proper environment to discuss the agenda on our table. My colleagues at the Council will be too happy to be of help to you. Please do not hesitate to call on them whenever you need their assistance.

CHAIRMAN'S ADDRESS

M.S. Gore
Chairman, Study Team

IN 1971 the University Grants Commission and the Indian Council of Social Science Research jointly appointed a committee to consider and specify the role social sciences could play in programmes of education for the professions of agriculture, engineering, and medicine. This Committee had among its members representatives of the Indian Council of Social Science Research, the All India Council of Technical Education, and the Indian Council of Medical Research. As a part of its work, the Committee sponsored some field studies and undertook an analysis of the present social science components in the curricula of the institutions training persons for the three professions under study. The data obtained from the field studies and from the analysis of curricula became available towards the end of 1973 and they are being made available to the participants in this Conference in a summary form.

We have invited to this Conference three categories of participants – teachers of professional subjects in the colleges of agriculture, engineering, and medicine; teachers of social science subjects in these colleges; and other social scientists who are interested in the study of the subjects of relevance to one or the other of the three professions. We visualize that the Conference will have two plenary sessions – one at the beginning and one at the end. This first plenary session will be used to outline the scope of the discussions of this Conference and the kind of questions that we would like to have answered. This will be followed by three meetings of each of the three sections – agriculture, engineering, and medicine – which will discuss the problem and the challenge of social science contribution to the respective profession. Each section will have all the three categories of participants – the teachers of professional subjects in one of the three areas, the social science teachers

in the relevant professional institutions, and other social scientists. The three sections will discuss the overall theme and the common questions that are outlined below, with reference to the profession with which they are concerned. We hope that the conclusions of the deliberations of the three sections will be available to all the participants in the concluding plenary session on the last day of the Conference. The benefit that the Committee will derive from these discussions is obvious, but we are also hopeful that the experience of participation in these meetings will have stimulated sufficient interest among teachers of the three professions – social scientists as well as scientists in agriculture, engineering, and medicine – for them to continue their discussions in their own professional groups. It is also our hope that social scientists who are currently not involved in teaching in these professional institutions will be motivated to study problems relating to the practice of these professions in society. The Committee feels that such interest and awareness among the concerned scientists is a necessary condition for a meaningful implementation, or equally meaningful modification or rejection of whatever recommendations it might finally make at the end of its labours.

I. What are the objectives of introducing social sciences in colleges of medicine, engineering, or agriculture?

The objectives can be varied.

One objective may be to widen the horizon of students and help bridge the gap between technology and social life so that we have agriculturists, doctors, and engineers who are socially more aware and responsive to the needs of society and do not function as narrow specialists. Such a perspective might lead to a basic change in the philosophy or orientation of the professions.

In medicine it may lead to the questioning of the legitimacy of an almost exclusive emphasis on clinical medicine as against preventive medicine and public health. It might also lead to questions of appropriate delivery systems for medical service – private doctors, community clinics, and socialized medicine.

In engineering it might raise questions about the technology

most appropriate to a developing nation. Should such a technology be labour saving or labour utilizing?

In agriculture it may lead to questions as to who is the appropriate major client for the services of the agricultural scientist – the large farmer or the small farmer, the person with irrigated lands or the one with dry lands, etc.

Another objective may be that social sciences should contribute to a better technical performance on the part of an individual professional by making him familiar with the social factors that affect attitudes to agriculture on the part of the community. Such are, for instance, the contributions of social sciences in epidemiology, industrial engineering, and agricultural extension respectively.

A third objective may be to enable the professionals concerned to get better equipped to perform some of the secondary roles they have to play as administrators and managers or as policy-makers and planners.

II. What should be the relevant social science content to be included in the various programmes of professional education?

This is an exercise that might benefit by an examination of the social science content of the existing curricula in the colleges of agriculture, engineering, and medicine. There will be found to be some considerable variation in such content as between local colleges, regional institutions, and institutions at the all-India level. The sections may want to discuss the desirability of such variation and specify what the minimum content should be.

The social science content specified by the section will naturally depend upon what are perceived to be the overall objectives of introducing social sciences in education for these professions.

The social science content will of course vary as between agricultural, engineering, and medical curricula.

It is hoped that the sections will be able to indicate the broad areas of social science knowledge that would be useful to get included in each of the curricula with which they are concerned.

Another perspective from which the social science content

may be prescribed is by distinguishing between the social science content in the education of the young professional and the content to be communicated to the persons who might later become teachers in these institutions, e.g., teachers of preventive and social medicine, teachers of agricultural extension, and teachers of industrial engineering and management. Very often teachers of these subjects are basically professionals in their respective fields, and their own equipment in social sciences may be limited. In defining the content of social science courses in technological institutions, a view is sometimes expressed that what technologists need are really the rudiments of social science. This may be found to be a fallacy and it may well be that what they need is rather the result of considerable and good research by social scientists – much of which may still have to be undertaken.

The sections may wish to take these perspectives into account in approaching their task of defining or outlining the social science content for each of the areas of practice.

III. What are the methods and approaches that should be adopted in the teaching of social sciences to students of the three professions?

By way of contrast, two distinct approaches may be counterposed. Social sciences can be taught individually or in an interdisciplinary fashion but largely on their own and following their own logical sequence of ideas. This may be marginally modified by introducing “cases” from a specific area of practice and to that extent the teaching of social sciences may get linked to the other academic programmes of the student. But, basically, in this approach sociology, economics, psychology, etc., will be taught as disciplines individually and inter-relatedly. The other approach will be to introduce selected social science content at appropriate points in the professional subjects where the social-cultural perspective introduces a major variant as, for example, in nutrition, epidemiology, or preventive health in medicine, or in the acceptance and non-acceptance of particular practices in agricultural extension, etc.

The adoption of one or the other approach will depend at

least partially on what our objectives are in the introduction of social sciences in education for the professions. If the objectives are limited to the improvement of immediate technological performance, one approach may have advantages; if the objectives are those of "liberal" education in a good sense of that word, then the other approach might be more meaningful.

Apart from the *approach*, the methods of instruction are also relevant. Some thought may have to be given to the relative place of lectures, case discussions, field exposure, and guided reading in the instructional programme in social sciences.

The next three questions – four, five and six – relate not so much to social sciences as to the social scientists.

- IV. Who should be recruited or appointed to teach social science content in professional colleges?
- V. What is the role of the social science teacher in a college training students for other professions?
- VI. In what way should social scientists and the teaching of social sciences be incorporated in the academic structure of the professional colleges?

These three questions are important and interdependent. I shall try to present the broader issues involved in deciding upon these questions. To begin with, these questions call for a definition of the kind of academic background that a person should have to be qualified to teach in a professional college. Should such a person be basically a social scientist who has an understanding of the problems of the particular profession, or should he be a *member* of that particular profession with some familiarity with social sciences? The answer may be that both these types of persons are required; or that one or the other type is preferred. In medical colleges and in colleges of agriculture, for instance, the social science input is at present primarily through the departments of social and preventive medicine and the departments of extension education respectively. Both these departments are staffed with persons whose basic degrees are in the particular professions – medicine or agriculture – with a specialized social science orientation at the post-graduate level.

• Is this satisfactory? Do teachers in these departments have

a sufficient grounding in social sciences to enable them to provide the total social science input that is necessary for the particular profession ?

Even if this were so, should social scientists, in their own right, be additionally recruited so that research on areas of interest to medical and agricultural science can be carried out from a social science perspective?

If social scientists are to be recruited either for research or for teaching, or for both, what quality and calibre of social scientists should be recruited to such institutions? Should they be persons who have just obtained their degrees or should they be persons with established work to their credit? Are persons of the latter type available? How can they be recruited? How can they be retained once recruited? What kind of institutional arrangement will ensure effective communication between teachers of social sciences and teachers of technological subjects?

Should efforts be made to stimulate and involve the interest of social scientists who may not be employees of professional colleges in the challenges and problems facing the profession or the professional? How can this be done? What machinery can be instituted for a regular exchange of ideas between social scientists working in non-social science institutions and social scientists in university departments of social science?

The answers to some of these questions depend upon the role we perceive for a social scientist in an institution of professional education. If the image of social sciences is such that it is assumed that all that needs to be known about relevant social factors is already known and that it has now only to be communicated to the agricultural, medical, or engineering student, then a person who has learned the known facts can adequately meet the demands made upon him. If, however, the role of the social scientists is to continually engage in searching for ways in which society limits and conditions professional practice and also the manner in which the profession influences society, then what is needed is a person with a basic grounding in social sciences and an ability to use social science concepts to analyse new situations as they arise.

Questions of role are tied up with questions of relative status. The preliminary studies undertaken by the Committee have indicated that the status of social scientists in professional

institutions is still undefined and not uniformly satisfactory vis-a-vis their colleagues. It is possible that social scientists are on the defensive because they realize that they cannot measure up to the challenge posed by the new situation in which they find themselves. The important point here is not to apportion blame, but to identify organizational forms which will attract persons of ability and provide them with the conditions of work and status conducive to creativity.

In seeking answers to some of the questions we may find that the problem posed by the introduction of social sciences in technological institutions is not entirely new. It has something in common with the problems posed by the introduction of basic physical and natural sciences – physics, chemistry, botany, zoology, physiology, biochemistry, etc. – in colleges of agriculture, engineering, and medicine. What can we learn from their experience ?

Another aspect of academic organization in respect of social sciences relates to whether social science departments in professional colleges should be staffed and enabled to offer social science degrees? Should preparation for such degrees be available at the undergraduate level or only at the post-graduate level? This question is relevant in the context of programme of social science instruction in some of the Indian Institutes of Technology. Can the pattern set by some of the Indian Institutes of Technology of establishing relatively large, well-staffed, and independent departments of social sciences and humanities be adopted by the Indian Agriculture Research Institute, the All India Institute of Medical Sciences, and other institutions of all-India status? Is the pattern suitable for the adoption of regional and local colleges?

Most of the questions and issues I have tried to raise are directed towards the professional colleges and to the social scientists working within them. But these social scientists are drawn from among those trained in the social science departments of universities. What goes on in these departments, the kind of emphasis or lack of it that characterizes the approach of these departments to their particular disciplines, is bound to influence the extent to which the social scientists within professional institutions can meet the challenge in their work. It is important that at least some of the social scientists in the depart-

ments of economics, sociology, psychology, etc., of our universities should develop an interest in analysing professional practice and the problems faced by professionals in these different fields. Unless they develop the analytical tools and the subject-matter familiarity for application of their knowledge in these areas, the university system will not be able to supply persons of the quality and the motivation required by the specialized institutions. There is, therefore, a need to develop at least a few centres in the country where social science knowledge relating to the fields of agriculture, engineering, and medicine is developed outside these institutions. Such centres will have to develop sub-disciplines of sociology or economics of agriculture, medicine, and industry. At the same time, they must help develop and identify areas of social science knowledge that will be useful to the practitioners of these professions.

The questions that I have raised are important or unimportant depending upon whether we do or do not accept the notion that social sciences have a tangible and significant contribution to make to the practice of particular professionals and, therefore, also to programmes for their education and training. I do hope that our deliberations over the next three days will validate this assumption and also help find answers to the questions I have outlined here on behalf of the Committee.

SECTIONAL CHAIRMAN'S ADDRESS

C. Dakshinamurthy

Member, Study Team

IT HAS OFTEN BEEN SUGGESTED that social sciences play an important role in the teaching of technical disciplines such as agriculture, engineering, and medicine. The main disciplines connected with this branch of study are economics, sociology, and psychology. Their impact has, however, been scarcely felt so far.

What is the objective of teaching social sciences in any professional discipline? It is perhaps to maximize output or production. Social sciences do this by harnessing human inputs so as to achieve a comparatively higher efficiency in the manipulation of certain technological skills. These skills become better operative under the desired interaction of the different individuals associated in the production operation. Social sciences in agriculture should be taught on a problem-oriented basis so that the student appreciates the necessity of practising this important discipline as and when he gets confronted with socio-economic problems that are likely to cause obstruction in the process of production.

Agricultural scientists are engaged in perfecting production technology, and the extension specialists are educating the farmers by planting the technology right on the farmer's field. The results are not spectacular, however, due to some inherent human problems associated with the overall production in a village or a cluster of villages. The farmer, although aware and convinced of the usefulness of modern technology, is often put into a helpless position when he has to deal with his neighbours in the several agricultural operations. It appears to me that the greatest stumbling block in reaching the potential targets in our country is not the lack of technology, but the difficulties encountered in mass production on land fragmented into small units. For example, if we attempt to demonstrate rice produc-

tion on a unit of 2,000 hectares, we find that some hundreds of farmers will be involved in this operation. Further, a farmer may possess one hectare in one place and a few other pieces of land, say, half a hectare and three-fourths of a hectare, at two other places away from his one hectare field, but within the common area of 2,000 hectares. There may be several instances of this. If we want to unite all these farmers into one group, and desire the operational advantages to be shared by them, it becomes easy if all the fragments of a farmer are brought together without affecting the interests of the other cooperating members. The necessity of introducing a social scientist to achieve the required result is at this point. The farmers, while grouping together into this unit, should have confidence among themselves and be free from mutual fears. The give-and-take policy though preached extensively is rarely practised. In this field of study Thailand, Philippines, and Taiwan are making rapid progress. The problems here are not merely economic and sociological, but psychological too, for proper leadership is required to create the necessary conditions for the acceptance of such a change. It is the interaction of all these disciplines, and the leadership required for a successful operation of a scheme of this type, that ensures increased production with the given resources.

Another aspect of this is in the rural credit system. Most of the farmers, though they are desirous of joining the groups and sharing their difficulties for the achievement of a common cause of increased production, can rarely afford to meet their requirements and procure the inputs for the agricultural operations. A spirit of cooperation among the farmers, though it exists in some areas, cannot by itself ensure them the economic stability for increased production. Here is the necessity for developing a suitable social structure with government's help to ensure all the participating farmers their due share in order to relieve them of their economic difficulties. For the success of agricultural operations and maximization of yields, the farmers should have liquid cash to purchase fertilisers and other inputs at reasonable prices. The structure of banks, particularly the rural banks, should be so organized as to help the farmer, to operate through a recognized cooperative, and to give him enough finances not only to meet his agricultural requirements

but also for his social needs. The work of banks and social scientists in the Philippines and Taiwan, where the production and the social needs of farmers are not seen in isolation, can provide fruitful guidelines. It is an important step to boost up production. A bold step by the government in re-organizing the social structure of the farmers seems to be essential in our country as well.

I wonder whether the present scale of social science studies in agricultural universities will be sufficient to fill the gaps. Although the rudiments of sociology and psychology are taught at this level, a specialist should be given more intensive training to motivate the community and bring about the desired results by the interaction of the inter-disciplinary subjects conducive for better production.

The inter-disciplinary approach is a *must* for solving our production problems. It is a pity that interaction even between well-established departments is lacking today. For example, the public works department which controls the release of irrigation water in the States should work hand in hand with the agricultural specialists for timely and judicious irrigation. There seems to be a big gap between the two departments in many States. Social science-minded administrators are required to enter into this field of activity to bring about a successful marriage between these two departments to enable production of more crop per drop.

SECTIONAL CHAIRMAN'S ADDRESS*

P.K. Kelkar
Member, Study Team

AS A RESULT OF discussions and visits to some of the engineering institutions, the Study Team has come to the conclusion that there has been in recent years a growing awareness of the need to incorporate courses in social science subjects into the engineering curriculum. However, there is a lot more that needs to be done, even though one or two institutions have made substantial efforts in this direction.

Social science in general covers a broad spectrum of disciplines and areas. It is, therefore, only appropriate that there should be meaningful discussion regarding the nature of the course content, the depth and the breadth attempted, the kind of mix that is desired, etc. In order to be able to create motivation both in the students and in the faculty, the course content should have professional strength, respectability, and relevance.

There has been a general tendency for many years to treat studies related to social science subjects as of secondary importance in comparison with engineering courses. The social scene has so dramatically changed during the recent years in this country that professional engineers cannot any longer possibly make effective contribution based only on technical competence. Unless they are made aware of the social and the political forces and develop an understanding of human behaviour based on appropriate study and training in this context, they cannot deal with the challenges that have been thrown up in recent years. Our failure in the implementation of development plans in the fields of electricity, food, health, etc., is basically at the level of human relationships in their broadest sense. An engineer without appreciation of social implications of his actions is likely to feel frustrated even though technically he is very

*This is a summary of the speech delivered by Dr. Kelkar.

competent.

Engineering institutions, therefore, must develop a positive approach towards incorporating relevant social science studies as an integral and important part of the total curriculum. Teachers in engineering must show respect to their colleagues in social science and vice versa. For something worthwhile to emerge, there must be an interdisciplinary thrust, and this interaction must be made visible through discussions, seminars, projects, tests, etc. This calls for a critical size of faculty and the right mix. The Conference should channel its efforts in discussing ways and means of achieving these objectives in a planned manner.

SECTIONAL CHAIRMAN'S ADDRESS

P.N. Wahi
Member, Study Team

STUDENTS AND TEACHERS all over the world are unequivocal in expressing their discontent with the existing medical educational pattern which, they say, is completely inadequate to train a doctor to meet the constantly changing needs of society. The changes are a reflection of the dynamic renovation of our social structure which has taken place especially during the past two decades. Since medicine functions as a part of the society, it must be amenable to change if it is to survive.

Dr. Clark Kennedy has well defined the role of the present day practitioner in the health care of the community. He says: "Doctors are no longer merely concerned with the ill health and the simpler issues of life versus death. In these days the profession is almost as much concerned, in conjunction with the social services, in promoting a higher quality of life lived by symptomatic treatment, by eugenic control of birth, by influencing development, by improving environment, by education in living, by advice on occupation."

The change in our education objectives has become obligatory, both due to the demands of our society to make total health a national concern rather than the concern of the individual, and due to the cry for relevance from the students based on their desire to be better prepared for their career prospects through specially oriented practice of medicine.

The changing pattern of society envisages a change in needs and demands. There is a tendency for a shift from the diagnosis of individual illnesses to the diagnosis of community health needs, e.g., illnesses, ill-conditions, and potential ill-conditions as a social phenomenon. The medical education imparted to the doctor should appreciate and understand these needs. For example, the unprecedented growth of towns and industries leading to urbanization, the consequent creation of slums and

the exposure of the individuals to inevitable health hazards, would require the doctor to be well-versed with environmental and occupational health problems.

This brings me to an important change in the concept of medical education, and that is the increasing realization of inter-dependability of medicine and society. Medicine is intrinsically and essentially a social science, and as long as this is not recognized we shall not be able to enjoy its benefits. This concept is based on two principles. First, that the health of the people is a matter of direct social concern, and that society has an obligation to protect and assure the health of its members. Second, that social and economic conditions have an important, and in many instances crucial, impact on health and disease. The aims of education should, therefore, keep in view the current social setting as well as the requirements of the future social structure of a developing country.

In order to practise the concept of medicine as a social science, new subjects such as human ecology, population dynamics, epidemiology, social sciences, geriatrics, community health care, and biostatistics have to be added to the undergraduate curriculum.

A positive approach to making the education of our doctors congruent with the needs of society is by directly involving the students in community health care programmes. The present clinical teaching in the hospital attached to a medical college should be expanded to include the district hospitals and the primary health centres – these would constitute the teaching hospital complex. The place of medical education is in the stream of life, and not on its banks. The doctor must learn to live with society. There is a complex relationship between scientific and social progress and behavioural change. What is needed is an in-depth study of the linkages between a medical institution and social changes.

The expectations of the society that a medical graduate will be a scientist as well as a fellow citizen, with a sense of responsibility to the community to offer his services whenever they are needed, will have to be fulfilled.

Successful practice of medicine depends not only on the clinical skill of the physician, but also on his understanding of the psychological, cultural, and social factors influencing the

patient's response to treatment. It is, therefore, essential that the doctor should be familiar with the concept of social sciences as an important component of medical practice. His contact with the academic medical centre on the one hand and the community on the other would help him marshal tremendous resources to effect social change.

This brings us to the consideration of the important role a medical institution can play as an effective social force. In the words of John A.D. Cooper, "Its role is strengthened by the high regard in which the University is held by society. Through its hospital, clinics and health centres, it maintains an intimate relationship with a wide spectrum of the community. The provision of preventive and curative health care offers special opportunities to introduce social changes, both through direct activities and the examples furnished. By advancing knowledge through biological, social science and health care research, medical centres can provide the basis for rational social progress."

The question is often asked as to how the knowledge of social sciences and its application to educational technology and health delivery would ultimately strengthen the public health programmes and make them more need-based. The education of a doctor as it is today, is under strong criticism at the hands of the government as well as of the public, because it does not provide the necessary motivation nor the medical proficiency to meet the demands of the present-day society which is 80 per cent rural. Social science skills can be utilized in developing a system of selection of students, in reforming the teaching methodology, in restructuring the curriculum to make it more relevant to career requirements, and, finally, in developing assessment procedures which would emphasize education rather than learning.

I do hope you will give special thought to developing curriculum content to include behavioural science and humanities. It appears that many medical faculties have already begun to offer courses in social and behavioural sciences which meet this new demand for a more relevant and committed approach to the problem of health care delivery.

We should also consider the time of introduction of social sciences in the professional training of doctors. Should it be part of an integrated approach throughout his training period,

or should it be an isolated programme, say a part of the training in preventive and social medicine? We should also consider whether it would not be more fruitful to provide training in social sciences in the pre-medical course, and whether some knowledge of social sciences should be considered an essential pre-requisite to admission. This could then be followed up during the medical college period as medical sociology rather than pure social sciences.

Another important question arises regarding who should teach social sciences. Should a medical teacher teach, should a part-time social scientist from the faculty of social sciences be entrusted with the training, or should the training be imparted by a senior full-time social scientist in the medical faculty? He would not only need to provide a core curriculum, but also to develop an integrated teaching programme with other departments emphasizing the social, psychological, and cultural factors influencing the health of the community together with the biological determinants. The student has to be made aware of the "importance of the social environment in the genesis and control of illness and of the role of social sciences in understanding medical care delivery, the doctor-patient relationship, and the social and psychological dimensions of illness". The medical school as an educational institution is now viewed as a social structure comprising doctors, patients, and other paramedicals. It is essential to understand the close linkage between the society and the medical school. Studies of social sciences in medical schools help inculcate goals and ideals, transmit knowledge, and develop skills that are essential to the solution of broad social problems.

All these considerations require considerable experimentation. Research in medical education needs more expansion than what we have been able to do till now. The most important question has yet to be answered, that is, the influence of the rural health delivery programmes on the educational policy of the academic institutions.

Following the report of the Royal Commission on Medical Education, many medical schools in Great Britain are introducing courses in behavioural sciences into the curriculum. These, of course, vary greatly in the course content, methods of teaching, length of the course, their place in the curriculum, and

also in the basic disciplines from which the teachers are drawn.

The Dundee Course* could be taken as an example. The course was taught by the faculty of medicine and consists of three components – medical psychology, medical sociology, and clinical methods. A special effort was made to produce it as an integrated course.

The medical sociology component had two objectives. The essential objective was to introduce students to the concept of society and to show them that an individual was both affected by the society in which he lived and that he in turn had an effect on that society – that is, to bring out the concept of inter-dependability of society and medicine. The second objective was to examine in greater detail some specific areas in medical sociology and to show that health, illness, and medical care should be seen and understood in a social setting. It was hoped that the students would understand the importance of the variations that would occur in human behaviour and the factors that might be responsible for these, especially the cultural and social background.

It is becoming obvious that in order to practise comprehensive medicine in the community, an interaction between the practitioner and the patient is necessary. It is essential to realize that the outcome of treatment will depend upon the response that the doctor is able to elicit from the patient – which in turn will be determined to a large extent by the physician's understanding of the psychological, cultural, and social background of the patient. To become familiar with the influence of cultural and social factors in disease, it is essential for the doctor to receive training in the concepts and theories of social sciences.

*Shilldrade, Peter, "Behavioural Science", *British Journal of Medical Education*, Vol. 8, No. 1.

INAUGURAL ADDRESS

George Jacob

Chairman, University Grants Commission

MAY I ASSURE THIS CONFERENCE that the U.G.C. has a continuing interest in the theme of this Conference to which it attaches great significance?

The main points to be considered by this Conference have been highlighted by Professor Gore. The three Sectional Chairmen have also emphasized many important questions. It is rather ironical that, after all this has been done, I am expected to "inaugurate" this Conference. May I pronounce the words of blessing at the end of this inaugural session?

Since you have invited me, I must say a few things. I do hope they will be relevant. The first main point I would like to make is that social change is becoming more and more rapid. Dr. Kelkar has also made some remarks in this connection. With increasing number of people and more rapid distribution of technological development, the pace of social change is becoming more and more rapid. For instance, I calculated the interval between a scientific discovery and its practical application. In the eighteenth century photography became a scientific discovery. It became a practical possibility after 112 years – sufficient time for people to adjust themselves. In the nineteenth century the discovery of the telephone took place; its practical application occurred after 56 years – again sufficient time for people to adjust themselves. Television came in the 20th century – the interval between the discovery and its practical application was only 12 years. In the case of transistor the interval was only a small period of three years. So we are living in an age where changes are fast taking place. Some social scientists estimate that changes in society in the next ten years will be about four times as many as they were during the past ten years.

The number of social scientists in professional education in the next ten years will also be about four times as many as they

were during the past ten years.

The place of social sciences in professional education in this context is a very valid point to be considered by this Conference. How best can this need be met? Professor Gore raised the questions: What is the purpose? What is it that a department of social sciences in a professional college should try to do? Should it merely pass on the standard wisdom of a social science, or should it attempt to face the challenges of a new situation? In my view, no academic discipline has any business to exist in any academic institution unless it is continually growing and is able to face new situations and new challenges. A social science discipline in a professional college must be able to face and meet new challenges and new situations. Dr. Gore referred to some of the I.I.T.s where they have a pattern of large and independent departments of social sciences. Years ago, physics taught in engineering colleges was considered to be inferior physics. Not that physics by itself was inferior; the department was never rated as high as the university department of physics because physics in engineering colleges was a secondary discipline.

The other day I overheard a discussion that took place in the Delhi I.I.T. The department of physics there claims that as a department of physics handling modern physics, it has an edge over the department of physics in the Delhi University. The department of physics at the Delhi University is one of our centres of advanced study – with six full professors and fifteen readers – the best that we have provided in a university set-up. Though I have not myself verified the facts, I am told that the I.I.T. department of physics claims that it is not only well equipped, but is superior. One of the reasons they put forward was their facility to change a curriculum as and when they thought it was necessary. The university takes a much longer time – and at the pace at which changes take place, by the time the university makes the change, the change itself becomes obsolete and a new change is called for. Thus, the department of physics in an I.I.T. claims not only parity but superiority over the best department of physics in any university.

Again with respect to social sciences, unless a department has a right to exist on its own, it will not be able to produce the best results. And, as has been correctly pointed out by

Dr. Kelkar, the attempt of an engineering scholar/teacher is to produce a very good engineer, a better engineer, as far as engineering is concerned; the attempt of the doctor/medical teacher is to produce a better doctor/medical man, as far as medicine is concerned. The function of a social scientist in an engineering institution is to produce a better engineer. Social sciences are an additional input into engineering, into medicine, and into agriculture. Neither engineering, nor medicine, nor agriculture can contribute this additional input on their own. This is where the function of social sciences in professional colleges comes in. The social science department will not be able to do it unless it operates at the highest level. In any institution, a department meant to do secondary work will never be able to have a dialogue on equal terms. Shri Naik, when he welcomed us, referred to the need for a dialogue between social scientists and scientists in the technical field. This dialogue will be possible only if social scientists are in the highest field, all the time grappling with new situations and new problems.

There is another aspect also. Dr. Kelkar referred to that kind of respectability which should be applicable to science and technology. What is this kind of respectability? In the case of social sciences, is it possible for us to introduce the same language as in the case of science and technology? There you do an experiment. You repeat the same experiment under certain conditions and you get the same results. One social scientist has a hypothesis in respect of a situation and is able to come to certain findings as a result of that hypothesis. Will another social scientist, with the same hypothesis, in respect of the same situation, come to the same conclusion to which the former has come? I think it is here that social sciences partake of the respectability of science and technology. It should be possible for one social scientist in one area to repeat experimentally and verify what another social scientist in another area has done. Will it be possible to do that? It should be possible if the findings and the conclusions of the different social sciences are respectable and reliable. And this is where the need for inter-disciplinary approach comes in.

I am very skeptical of large-scale use of computers by our social scientists. They are trying to use a technology, or a technique, which our technicians and scientists use. What is the

material that you feed in your computers ? An enormous amount of survey data you have collected through questionnaires from a large number of people. I remember that years ago Shri S.K. Dey wanted to find out from the National Institute of Community Development the reaction to community development programme in the country. He made a sweeping survey of many States and had the data collected and analysed, and when the data put out came to me, I looked at it and found that awareness of community development was least in the State of Mysore, as it was then called (the present Karnataka), while my own State of Bihar had done exceedingly well. I know these areas fairly well. I wondered how this happened. Then it was found that the investigators in Mysore were female investigators and they went only to women and collected the data from them. Thus the process of collecting data was different, and yet we were coming to general conclusions. So I said, "You add up the whole thing, and for a national figure, the awareness of community development is all right, the error of one area is corrected by the error of another area."

This reminds me of a Supreme Court Judge who applied all his legal knowledge to solve a very ticklish legal issue which had been built up on the basis of the First Information Report cooked up by the Daroga. Now the important thing was what had been drawn into the original report. I think, in social sciences, the social scientist's appraisal and assessment of a situation, his judgement of a particular phenomenon is a very important point. In experimental physics, a young physicist can repeat the experiment which a senior physicist has done. He will get identical results. But a mature social scientist, looking at the same data, will be able to draw correct conclusions which a young social scientist may not be able to draw because the conclusions depend on the assessment of all the data that are available and on their interpretation. But social sciences will take on the respectability and dignity of other sciences if there is more of an inter-disciplinary approach, so that one social science supports another, and each social science, in its own right, is able to establish itself in all technological and professional colleges.

Again, in medical colleges they are not able to do very much of social sciences because of the fast increasing amount of knowledge that has been put into the medical curricula. This is, of

course, an important exercise. Today you teach in mathematics in the first year in a university the things which were taught at a very advanced stage about ten years ago. The syllabus and the curriculum have to be modified, and yet the students can be taught the subject. We have to prune the things which can be pruned when new things have to be brought in. If you are not going to prune the things which have to be pruned, then you cannot bring in new things, and if social science cannot be brought in because the curriculum is already too heavy, I think, this cannot be an answer because eventually it has to be brought in.

I have nothing more to add to what has already been contributed by the Chairman and the three Sectional Chairmen. And I take this opportunity to formally inaugurate this Conference.

VALEDICTORY ADDRESS

S. Nurul Hasan

Minister of Education, Government of India

I AM VERY GRATEFUL to the University Grants Commission and the Indian Council of Social Science Research for having invited me to deliver the Valedictory Address of this Conference. Being a social scientist myself, I recognize the significance of a conference of this type, not only for professional education, but for social sciences as well. I must congratulate the University Grants Commission and the Indian Council of Social Science Research for having decided to make a joint study of this problem and for having convened this Conference which is the first of its type.

We, in India, have opted for a democracy and not for a technocracy. We should, therefore, guard ourselves against the danger of subscribing only to the values of science and technology. In the larger interests of Man and Society, it is necessary that we also emphasize the social values. Science and technology cannot be considered without reference to the social context, and scientific values and social culture must be cultivated together. Their inter-dependence is being emphasized more and more in all parts of the world; and it is necessary for us to be aware of it if we desire to secure coordinated development of our country.

It is essential that technologists should have an adequate understanding of the social context. This does not imply an underestimation of the importance of science and technology, we need, of course, a first-rate technologist. But this alone is not enough, and a knowledge of the social context is essential even to produce a first-rate technologist. It is only this knowledge which can help him understand how the services of technology can be harnessed to improve the quality of life for all and to evaluate the progress made in social and human terms. I realize that there is often a problem in reconciling the values of

science and humanism. It is necessary to remember, however, that they are so inter-dependent and close-knit that both must be simultaneously developed.

An inter-disciplinary approach is essential for development; and from this point of view, the students of different disciplines in natural and social sciences have to cooperate with one another. While cooperation is basic for all advancement, no single form of cooperation is sufficient to meet all the situations. We will have to try a variety of forms and expand the most suitable ones still further. Group research jointly undertaken by a team of teachers and students is obviously a very important form of cooperation in promoting the aims of science and humanism.

While such cooperation is necessary even for the richest countries, it assumes paramount significance in developing countries where resources of all types are extremely scarce. On account of financial and other constraints, no single college or institution may be in a position to carry out a significant programme of inter-disciplinary research. This difficulty can be overcome if there is collaboration between institutions and departments. Personnel, equipment, etc., can be borrowed and lent between institutions. Library facilities can be extended so that more than one institution can have access to these resources. Further, cooperation and collaboration need not stop at the level of exchanging of manpower and other facilities. Different institutions could cooperate even in the granting of degrees. A person who graduates in two disciplines could perhaps be given a joint degree by two institutions. It would be necessary to work out the above ideas in greater detail. Perhaps more working groups could be appointed to take up this idea and promote it for wider circulation.

I congratulate the participants of the Conference on the excellence of their speeches and the thought-provoking issues they have raised with reference to the inclusion of social sciences in professional education. I would request the U.G.C. and the I.C.S.S.R. to make available to us, as early as possible, the proceedings of the Conference and the report of the Study Team so that we can initiate the necessary action thereon.

VOTE OF THANKS

Yogesh Atal

Member-Secretary, Study Team

I AM INDEED HAPPY that this Conference has been convened. There must have been something wrong in the configuration of the stars on the day when the idea of organizing the Conference was born. For one reason or other, we have had to postpone it on more than one occasion. The Study Team and the Indian Council of Social Science Research are grateful to the scholars who graciously accepted our invitation and attended the Conference. We are especially happy that fellow colleagues from the professional fields of agriculture, engineering, and medicine responded favourably to our invitation.

The object of this Conference is to set up a communication bridge, to provide a "round table" for a chat between social scientists and technologists. Some ten years ago, this might have been unthinkable. That this has become possible today augurs well for social sciences.

Social sciences have been granted a visa to enter the territory of the "professions". As happens with a stranger in an alien land, social sciences have been looked upon with suspicion by some of the students specializing in professional fields. This is quite natural. In our scheme of priorities the faculty of science ranks supreme, followed by the faculty of commerce. Arts and social sciences are generally treated as the faculty of "frustrates". Those who have succeeded in obtaining admission in engineering, or agriculture, or medicine regard themselves fortunate and superior. In their mental frame they dissociate themselves from all that goes in the name of arts and humanities. When such people are reminded of the role of social sciences, and are required to undergo training in them, all too often they become resistant to it. What have they to do with social sciences? What can social sciences do for them? They also come to know of the fact that their teachers, and other distinguished leaders in the

profession, did not undergo this "torture"; why then are they subjected to it?

The estranged social scientists also suffer from a certain degree of ambivalence. They are worried on the one hand that their visa may get invalidated, and on the other that they may be ostracized by their own professional community.

Social sciences have not yet been naturalized in professional institutions. They still carry the passport; they are still suspect.

There is, however, a definite change for the better. The vocabulary of social sciences, previously decried as jargon, is getting diffused and is being employed by people in several walks of life. There is evidence of the utilization of social sciences and behavioural research. Teaching of social sciences to students graduating in technical fields has a different character. The social scientist faces a somewhat hostile audience in the classroom and he is aware that his teaching investment is not for the production of specialists in his own field—they are not going to be sociologists or economists.

It is these very special features of the situation that are the concern of the Study Team. The deliberations at this Conference will greatly help us fashion our recommendations.

Social sciences are now sophisticated disciplines. They have something to offer to the professions. Some practitioners can be overenthusiastic and may make false claims or oversell their bill of goods. But social sciences ought not to be blamed for the mistakes of individual enthusiasts. Arguing the case, Scroggs wrote:

When we find a charlatan vending snake oil we don't find fault with doctors; instead, as the spirit moves us, we either pity or despise the rascal's gullible victims. Medicine and its allied sciences have attained a status which is so clearly defined and so well understood that they are not attacked when physicians do not work miracles or when quacks prostitute a noble calling to base ends. Economics and all the social sciences, on the other hand, are still in the making Owing to the complicated character of the materials with which these sciences are concerned, their development cannot be hurried and their application is unavoidably limited. Those who are impatient with the ailments of human society demand

too much when they expect social science to diagnose the malady, write a prescription, and soon have the patient on the road to recovery.

The claims of social sciences are thus modest.

Friends, this is an invitation to plunge right away into the discussions and sort out the problems.

We are grateful to Professor Jacob for initiating the discussion and ushering us into the dialogue chamber. We are equally thankful to Professor Goie, Professor Dakshinamurthy, Professor Kelkar, and Professor Wahi for sparing their valuable time and delivering the key speeches. We are extremely indebted to Professor Nurul Hasan for his inspiring Valedictory Address. I would like to utilize this opportunity to thank Mr. T. Srinivasan, Secretary, Indian Council of Cultural Relations, who willingly and promptly agreed to our request and allowed us the use of the Council's premises for this Conference. His colleagues have been very cooperative indeed.

I feel embarrassed to thank my own colleagues at the I.C.S.S.R. who have suffered with a smile on their face. I am indeed fortunate to have such an excellent team of co-workers. And, finally, I offer my thanks to the Press – they will, I am sure, have enough in our deliberations to report to the wider audience and thus help build an environment for the dissemination of the culture of social sciences.

*Scroggs, William, as quoted in Clyde Kluckhohn, *Mirror for Man*, New York, Whittlesey House, McGraw-Hill Book Co. Inc., 1949, p. 263.

WORKING PAPER I

SOCIAL SCIENCES IN AGRICULTURAL EDUCATION

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IN INDIA, sporadic attempts were made even during the time of the East India Company (1600) to have schools for training in agriculture. Agriculture was included as a subject of study in the industrial or manual training schools. It was only when Lord Linlithgow became the Viceroy in 1936 that agriculture received more recognition and new agricultural colleges came up. Six agricultural colleges were started in India in the beginning of the 20th century, of which the first was the Agricultural College at Sabour in Bihar. The others were located at Lyallpur, Kanpur, Nagpur, Poona, and Coimbatore. The Royal Commission on Agriculture, in its report of 1928, recommended greater association between the agricultural colleges and the universities by affiliating the two. The results were twofold. Whereas it enhanced the academic status of these colleges, it also led to the progressive limitation of their functions to that of teaching only.

The changing conditions following Independence called for a drastic change in the system of education. This need had been rightly emphasized by the Radhakrishnan Committee on Education in 1949. According to the Committee, "Educational systems are built for a time and not for all times. . . . Realizing that the vision of free men in a free society is the living faith and inspiring guide of democratic institutions, we must move towards

that goal, adapting wisely and well to changing conditions.”¹ The idea of a change in the basic structure of the educational system in order to change the thinking of the people and to prepare them for future conditions has also been emphasized by the Prime Minister, Smt. Gandhi. The Union Agriculture Minister, Shri Fakhruddin Ali Ahmed,² while charting a new strategy for the Fifth Five Year Plan, pointed out on 10 July 1972 the need for a radical change in the agricultural educational system to meet the new challenges. Thus a breakthrough in agricultural education became imperative to change the institutional outlook of the masses. This would help to banish the bone of poverty among Indians, by meeting the demand for food production to feed the growing population and by improving substantially the standard of living of the people.

With the foundation of agricultural universities in India, there was an improvement in the traditional system of education. The ground was prepared by the Radhakrishnan Committee (1949). The seed was sown by the Indo-American Team on Agricultural Research and Education (1955). The views of the team were accepted and the Second Joint Team on Agricultural Research and Education (1960) pointed out that the key to increasing agricultural production was a coordinated system of agricultural research and extension brought about through the agency of a well-established agricultural university. The concept of agricultural universities has been modelled on the pattern of the Land Grant Institutions of America, which have been described as “the most comprehensive system of scientific, technical and practical higher education the world has ever seen”.³ Parker⁴, in his paper presented at the World Conference on Agricultural Education and Training (1970), stated that setting up of agricultural universities with new systems of education

1. India, Ministry of Education, *Report of the University Education Commission*, Vol. I, December 1948–August 1949, New Delhi.
2. Now President of India.
3. Indian Council of Agricultural Research, Joint Indo-American Study Team Report No. II on Agricultural Education, Research and Extension, New Delhi, 1960.
4. Parker, E.B. *et al.*, *Communication and Research Productivity in an Inter-disciplinary Behavioural Sciences Research Area*, Stanford Institute for Communication Research, Stanford University, 1968.

had almost resulted in a quiet revolution in the field of agricultural education. According to the Indian Council for Agricultural Research (I.C.A.R.) (1969), the concept of agricultural universities has been accepted as a material policy on education. It is expected that each State will soon have at least one agricultural university as recommended by the Kothari Education Commission (1966). There are now 19 agricultural universities and 23 National Institutes in India following the American Land Grant system.⁵ There is no uniformity in the pattern being followed in different agricultural universities since they differ in many ways in their approach and action. Various colleges and institutions are still continuing the old system of education, whereas some agricultural colleges/institutes/universities are following new systems of education, viz., trimester/semester. It is difficult to speak in favour of any individual system of education – old or new. Each has its merits and weaknesses. The first agricultural university was established at Pant Nagar in 1960. As the demand for setting up more agricultural universities in different States came up, the I.C.A.R. set up in 1961 a Committee called the Agricultural University Committee. A policy letter was issued by the Government of India in 1961 to all the State governments, defining certain guidelines for the establishment of agricultural universities. The following is an extract from this letter:

“Under the existing system of agricultural education in India, education, research and extension are completely divorced from each other, and the training imparted to the agricultural graduates is mostly theoretical. The new system ensures the inter-relationship and continuity of the three aspects of the teaching-learning process. Apart from many features of the new system of education over the traditional system, the most important one happened to be the emphasis on basic sciences and humanities in the curricula, and stress on rural life.”⁵

The realization of the importance of integrating three aspects,

5. India, Ministry of Food and Agriculture, Letter No. 20 (22) 100 Edn. I dated 22-8-1961, from the Special Secretary addressed to the State governments.

of agricultural education, viz., teaching, research, and extension, also developed on the basis of earlier experiments conducted in the form of community development and other related programmes. These programmes had highlighted some of the field problems for the agricultural educationists to take cognisance of, and developed agricultural education largely oriented towards problems with respect to field conditions. The community development project was started as a part of a rural reconstruction programme based on earlier efforts and other experiments conducted in the country, such as Rural Reconstruction Programme of Shanti Niketan, Spencer Hatch's Project at Martendam, F.L. Brayne's Experiment, Firka Development Scheme, Grow More Food Campaign, etc. A large number of trained personnel were required to strengthen the organizational structure developed to implement the programme of agricultural development at the field level. The infrastructure and the manpower needed to implement these programmes remained by and large the major concern, and in a sense very little effort was made to understand the context in which these programmes were being implemented. As a result, greater importance was given to the development of organizations such as Intensive Agricultural District Programme (I.A.D.P.). Programmes of this nature, although based on sound organization principles, failed to come up to the expectation in terms of increasing food production and agricultural development. Some of the main factors which contributed to such a state of affairs were: (1) lack of technological breakthrough and (2) lack of proper understanding of farming communities and the context in which they functioned. It was realized that unless new technologies, which could establish their superiority over the traditional ones, were developed, it would not be possible to increase agricultural production. To overcome this problem, intensive efforts were made by way of research in agriculture during the years 1965-67 and new high yielding varieties of wheat were developed. A programme known as "high yielding variety programme" was undertaken on an all-India basis to extend the benefit of technological breakthroughs by extending them to farmers belonging to all categories and living in different agro-climatic regions. It was at this stage that the need for proper understanding of the farming community in relation to technology became imperative,

and the need for integrating education, research, and extension was strongly felt.

Emergence of Social Sciences

The emergence of social sciences in the field of agriculture was by and large a gradual process. In the beginning, subjects such as agricultural economics, extension education, and rural sociology became the areas of interest in agriculture. Chronologically, first among the three was agricultural economics, and the last, rural sociology. Agricultural economics was adopted long before the other fields of social sciences. The integration of agricultural economics in the agriculture course is well recognized and it had become an accepted discipline in the agriculture curriculum. The contribution of the other disciplines of social sciences (sociology, anthropology, public administration, and psychology) are varied in nature, each contributing to the realm of knowledge of agriculture beyond its traditional boundaries of the laboratory and on-campus teaching and research. In the initial stage, the major role had been played by extension education coupled with the knowledge derived from the field of rural sociology. The field of extension education is a multi-disciplinary concept through which the importance of social sciences has emerged. In essence, all social science fields, excluding agricultural economics, have found their application to agricultural education through the nucleus of extension education. But for extension education, it would have been difficult to justify the discipline of social sciences as an essential part of agricultural education.

It is therefore, necessary, to describe briefly the historical development of extension education in the curriculum of agricultural education, and to describe the historical perspective of linkage of social sciences. The teaching of extension at the undergraduate level in agricultural colleges started in the fifties. The earliest recommendation to include extension education in the undergraduate curriculum was made by the principals of agricultural colleges at a conference held at Hyderabad. Following this recommendation, a large number of agricultural colleges started introducing agricultural extension in their undergraduate

curriculum. As pointed out earlier, the pioneering role in introducing it had been played by the Bihar Agricultural College, Sabour. By the year 1960, all the agricultural and veterinary colleges had introduced agricultural extension.

The Directorate of Extension Training, Ministry of Food and Agriculture, Government of India, floated a scheme providing financial assistance and technical guidance for the establishment of the Extension Wing in agricultural and veterinary colleges for teaching of extension education and carrying out of extension activities in a Community Development Block. A number of institutes, for example the Agricultural Institute (Allahabad) and the Indian Agricultural Research Institute (New Delhi), started extension education in their teaching curriculum in some form or another, along with an extensive approach to field extension activities. About the same time, veterinary colleges such as the Indian Veterinary Research Institute also took the lead in adapting extension in their curriculum. The rapid rate of adaption of extension education in the curriculum of agriculture at both the graduate and the undergraduate level led to the problem of trained manpower. Due to the lack of facilities for post-graduate teaching in the country, most of the trained manpower – especially those with a Ph.D. – had to be trained in foreign countries, particularly in the U.S.A. This was considered to be a great lacuna and resulted in a lack of contribution to the agricultural curriculum.

The spokesmen for initiating the programme of post-graduate training in extension took considerable pains to evolve a programme of post-graduate training in extension education which was geared to the problems of the country. Nevertheless, the philosophy of extension education remains confined to the methods and approaches developed in foreign countries, especially the U.S.A. The training of manpower to take up the responsibility of post-graduate teaching in extension education in India was largely done with the help of universities such as Cornell and Wisconsin. Eminent professors at these places also contributed a great deal by their personal visits to India. It is worth mentioning that the visits of Dr. J. Paul Legan (Professor of Extension Education, Cornell) in 1959 and 1962 can be considered a landmark in the development of post-graduate extension education in the agricultural curriculum. One of

his major contributions was to develop a plan for establishing a Division of Extension at the I.A.R.I. which could offer full M.Sc. and Ph.D. degrees. This was worked out by giving considerable importance to staffing patterns and the quality of personnel required to handle the syllabi most effectively. The programme of extension education at the post-graduate level developed at a very fast rate and so it was not possible to quickly man the expanding field of extension education. As a result, persons with unrelated qualifications and less experience were given the leadership role which could not be handled by them at this stage. However, this was a sort of transitional period, and within a short span of time this problem was overcome as and when trained personnel with doctoral degrees and qualifications became available. Although in the initial stage persons from fields other than extension education were employed for handling the responsibility of organizing the teaching and research activities of the post-graduate institutions, their experience provided a basis of linkage between agriculture and extension education. Social scientists who had entered the departments of extension education in the early stages lacked the needed experience of the environment in which they had to operate and relate. However, they soon correctly identified their areas of contribution to be in the development of dimensions such as (1) methodology of research, (2) scales and other instruments of data collection, and (3) application of relevant models and theories for the enrichment of the content of the extension teaching programme. They also participated by scrutinizing the previously developed syllabus and increasing the number of courses in the field of social sciences.

This was the trend during the year 1965-1966 when the interaction of trained personnel from the fields of extension education, rural sociology, and educational psychology had brought about considerable changes in the course content. Implementation of the course content was further facilitated and modified as a result of the development of a new system of education based on the trimester and semester system.

Along with this, there was an increase in the application of the concepts of social sciences, especially of sociology and psychology. At this stage rural sociology, as pointed out earlier, became an integral part of extension education. This is

evident from the syllabus of many agricultural universities. The Extension Division of the I.A.R.I. had played a pioneering role in this development. The introduction of social sciences into the extension education curriculum took place on the assumption that the knowledge of social sciences would accelerate development in agricultural production and the other areas of rural development. To bring about the desired changes, technical knowledge must be coupled with the skill to communicate that knowledge and understanding to rural people. In this context, it was essential that the discipline of social sciences be taught not merely for the sake of theoretical and academic values, but as applied subjects whose concepts and principles had a definite practical value in promoting desirable changes among rural people. In addition to rural sociology, educational psychology also became equally important within the framework of agricultural education, as there was a need for understanding some of the factors which contributed to the behaviour of farmers. The personality dimension of the farming community and the processes relating to the learning and teaching of adults and youth, became some of the major areas of concern, again not only for theoretical and academic purposes, but for practical reasons as well. Some institutions had given higher weightage to social sciences by introducing courses such as elements of rural sociology, psychological basis of human behaviour, etc. Others simply integrated the concepts and the relevant models and theories in the framework of extension methods into their existing courses of extension education such as programme planning, extension methods, administration, and supervision. As pointed out earlier, the limiting factor in the earlier stages of the history of application of social sciences in extension (agricultural education) happened to be in the form of a lack of well-trained manpower from the main stream of the discipline. As a result, students who were required to take up such courses were taught by persons who had marginal academic training to handle these courses, for they had no exposure to sociology and psychology. As a result of this, the process of application had to be slowed down. As soon as the manpower and the students' orientation were ensured, the development of the application of social sciences in the agricultural curriculum became much faster than expected. For illustration, in the year 1961 in the

Division of Agricultural Extension of the I.A.R.I., a total of 20 courses were designed for extension education, out of which 10 were in the field of rural sociology and psychology. This approach of giving emphasis to social sciences in extension education proved very fruitful and rewarding. It became possible to train manpower not only for handling the responsibility of teaching and research in extension education, but even for the effective job of managing the extension activities at the field level. It was deemed necessary to utilize the experience of the I.A.R.I. in developing such a syllabus and an ad hoc committee was appointed to prepare a model syllabus. The recommendation of the committee was given at the time of the Sixth Session of the Indian Council of Agricultural Education held in Ranchi at the Agricultural College, Kanke, in October 1962. The model syllabus suggested the courses to be included in the extension curriculum, for example, rural sociology, research methodology, statistics, communication, educational and social psychology. Of these, communication occupied the most important role. The year 1961-62 can thus be considered to be the era of expanding knowledge of social science in the field of agricultural education. A broad survey of the situation indicates that a number of agricultural universities made sincere efforts to employ social scientists and to develop content areas of social sciences at all levels. The students were given opportunities to take more courses in social sciences (such as rural sociology, educational psychology, and social psychology) in addition to what they indirectly studied under their major field of extension education.

An analysis of the entire situation concerning the adoption of social science fields into agricultural education indicates that there was tremendous institutional variation. But the fact remains that social sciences have now occupied a definite place in the agricultural education system, particularly in agricultural universities/colleges. The position with respect to veterinary colleges is different. In such colleges social sciences are still struggling for a rightful place. The analysis further indicates that social sciences were not properly understood within the field of agriculture till the concept of extension was accepted. Even at this stage, the application of social sciences was not well conceived of. Another problem at this time was that almost

everybody thought that the contribution of social sciences was obvious, as a result of which they considered themselves to be experts in the knowledge of social sciences and also of extension. There was also some evidence of a personality conflict between the social scientists on the one hand and experts in extension education on the other. The extension scientists thought that the entrance of social scientists in their field would endanger their identity. Similarly, the social scientists felt that they would lose their identity with their parent disciplines if they entered an area which had not defined their role and contribution very clearly. This particular stage did not last long. The next stage came when the contribution of social sciences became an integral part of the curriculum of agriculture education. This realization came when qualified persons in the area of extension education and social sciences were employed to work in newly created agricultural universities/colleges/institutes. A general consensus developed regarding the need for trained personnel with sufficient knowledge of social sciences. With this kind of support of social sciences, the field of extension education acquired better status both in teaching and in field extension in agricultural education. Now many departments of extension education are well established, and faculty members of social sciences enjoy good reputation. Their contributions are well recognized. Many agricultural universities now have departments of basic sciences and humanities, which are gradually coming up on par with their counterparts in the existing universities, such as Delhi University.

Contributions

Social sciences have contributed to the development of extension education in agricultural education either by including their theories, methodology and principles in certain extension courses or by offering courses which are directly in the main stream of their discipline.

The courses in which social science knowledge contributes indirectly are agricultural administration and supervision, training of extension personnel, rural institutions, programme planning, extension teaching methods, etc. The direct contri-

bution of social sciences (sociology/rural sociology) in the field of agricultural education, within the framework of extension education, is in the form of elements and concepts, leadership, community organizations, methods and techniques of social science research, technology and social change, etc. In addition, courses belonging to areas of educational psychology dealing with the psychological basis of human behaviour, group dynamics, dynamics of change, psychometric techniques are offered. Such an integration of the course content is becoming increasingly fruitful. As far as the contribution of social sciences in the research aspect of agricultural education is concerned, it is by and large in the form of providing the approach and methodology of social sciences. Social science research in extension emerged when Allahabad Agricultural Research Institute launched its experimentation of the project popularly known as Jamuna Par Punah Nirman Project. The approach of this study was mainly evaluative. However, the material obtained through this study contributed to the book *Gaon Saathi*. Later on, most of the researches in the applied areas of social sciences in extension happened to be in the form of master and doctoral theses. By and large these studies have used sophisticated and analytical tools drawn from the field of social sciences (sociology and psychology). In the initial stage most of the studies were non-experimental in nature. Tools and techniques such as case studies, field diaries, interview schedules, record consultation, commonly used by cultural anthropologists and sociologists were utilized. Soon came the second phase and an emphasis was given to sampling design and statistical treatment of data. There was use of rating scales, sampling, statistical tests, and experimental design during this phase. Then came the third stage when psychometric methods and statistical treatment of data were largely used in extension research. Finally, another phase came in where the concern was of developing a conceptual model based on the knowledge derived from the field of social sciences as related to extension problems. As a result of these developments, particularly those related to the data-collection techniques and to the formulation of the conceptual framework (theoretical orientation), it became necessary to examine a relatively large number of socio-psychological variables to understand problems of extension such as communication, adoption

of technology, etc. As a result of this development, there was a realization of the need for effective handling and processing of data through the use of computer. In the beginning, sophisticated use of research techniques and methodology, a conceptual framework, and use of computer for data-processing were done at the I.A.R.I. However, it diffused to other institutions and universities as well. Such a breakthrough was possible because of the collaboration of extension educationists and social scientists. The unit of analysis for many of the research studies relating to extension was the farmer, local institutions, family, village, etc.

At various conferences and seminars, particularly the All India Seminar on Extension Research held at Bangalore in 1969, there was considerable concern and interest in evolving sophistication in extension research. Based on the papers presented and the deliberations at the Bangalore conference, a book has been published entitled *Research in Extension Education* which gives a good overview of the researches done in this field. For a decade now, social sciences, as a result of their integration in agricultural education in the form of extension research, have not only explored new areas of research, but have also contributed to the development of new social science concepts, methodologies, and techniques of research. The main areas which have been explored are as follows: adoption and diffusion of innovation, communication process and media, extension techniques and methods, training of farmers and extension personnel, programme content and planning, rural organizations and institutions, administration and supervision, group dynamics, home science extension, concepts and role of agricultural universities, and scales and instruments in extension research.

The conceptualization of social change resulting from the adoption of agricultural innovation was by and large a major contribution. Through this, it was possible to study the concept of instigated social change and adoption and diffusion of innovation. The major focus of researches and studies had been on the individual as the decision-making unit. Among all the areas of research in which social sciences have contributed, adoption/diffusion research has been the fastest growing and probably the most widely known and accepted. The research emphasis in this area grew out of a practical problem situation.

The early work in this area was oriented towards communication, with emphasis on sources of information. Gradually, the behavioural component of farmers in relation to innovations was analysed on the basis of social system variables, with respect to both adoption and diffusion. The methodology of research in these areas ranged from less sophisticated techniques such as case studies to highly sophisticated methods such as factor analysis, multi-variable analysis, etc.

The problem of communication of new farm technology highlighted the need for finding a solution out of the knowledge developed in social science disciplines such as sociology, social psychology, etc. The various models and theories of communication have been examined to study their relevance for explaining the factors associated with problems of communication of farm technology within an organizational set-up as well as from the source to the farmers at the field level. Communication has been considered to be an important element in the social change process. The concept of social change includes, in addition, the societal and individual consequences that result from the communication of farm technology. Other specific aspects of communication such as effectiveness of information media in relation to farmers as well as to the nature of the information, have also been studied on the basis of knowledge derived from the field of sociology, psychology, and social anthropology. The contribution has brought about an understanding of the communication process in terms of the sources of communication at different stages of adoption, communication source vis-a-vis characteristics of innovation, audience credibility, etc. Studies reported have also shown the importance of effective communication in promoting technological change in farming. Besides this, the idea of a differential strategy for progressive and non-progressive villages has come into existence as a contribution of communication researches.

Another area through which social sciences have made a contribution is that of extension techniques and methods. Hitherto efficient use of extension methods for the success of new strategies in planning for self-sufficiency in food production had been the main concern of this area of research. But with the entrance of social sciences such as psychology and sociology into the agricultural disciplines, a new dimension has been

introduced to solve this problem, that is, by studying the characteristics of the audience where desirable social changes have to be effected. This refers, in other words, to the evolution of communication strategy in terms of using relevant extension methods and techniques suited to the farming community to be educated and changed. Such an approach has enabled the extension researches to be more realistic and precise. Characteristics of teaching and learning processes in extension education, classification of methods and principles of selecting effective combinations of extension teaching methods, are better utilized now in the context of the farming population whose characteristics are known to the extension researchers and field workers.

Similarly, the advancement of social sciences has contributed to improved training programmes for farmers and extension personnel. The study of the dynamics of human behaviour and the needs of the client system, come under the purview of social sciences and thus enable the trainer to have a better insight into the problems. The concept of training, factors affecting training, current trends in training, conceptual models of training, training methods, and the follow-up of the programme, and, in fact, the entire training strategy has to be developed keeping in mind the characteristics and needs of the training group. To this end, the contribution of social sciences has been of immense value.

The nature and importance of extension programme planning has also undergone a significant breakthrough as a result of the influence of social sciences. Principles and processes in developing a sound extension programme, planning process, identification of the problem, formulation and statement of programme objectives, and the concept of total extension programme are now viewed as a social action process. The organizational structure for planning, understanding the role of the extension agency, subject-matter specialists, local leaders, and institutions in planning and implementation of the extension programme have to be done in the light of the social structure in question.

Another area in which social sciences have made an impact is the area of rural organization and institutions and organization of promotion of rural youth programmes. The role of youth in community development, the modern concept and

objectives of rural youth development, understanding of basic needs and interests of youth and their problems, requirements for successful youth organizations, etc., are some of the important aspects on which social sciences such as psychology have carried out depth studies. The field of adolescent psychology has immensely helped the extension personnel to evolve programmes for the rural youth so that their abundant energy which was being wasted can be channelized into constructive and creative work. This has also led to the comparative analysis of rural youth programmes in certain selected developing countries. The same impact can be observed with regard to other rural organizations and institutions as well.

Likewise, the area of group dynamics in agricultural planning owes a great deal to social psychology. The teaching and learning situation with reference to groups must basically be dealt with at the psychological level in order to be effective. Social dynamics, social behaviour, its motivational aspects, small groups and their characteristics, functioning and importance in rural community development, important methods of studying social behaviour, roles in working groups, social norms and prejudices in rural society, and ways of removing these prejudices are some of the very vital elements of the study of the population in which desirable changes have to be made. An agricultural strategy, to be sound, must involve a thorough understanding of group dynamics and human relations and these cannot be studied without the aid of social sciences such as psychology and sociology. Besides, other important phenomena such as propaganda and the socialization of the individual are also among the chief contributions of social sciences in agriculture. Agricultural extension requires the development of a formal organization which can effectively implement its programmes in the field. In view of the dynamic nature of agricultural technology and the need for self-sufficiency in production, formal organizations must be evolved and the structure developed so as to meet these requirements. The researches in this area have indicated that the bureaucratic models – such as Weber's model – could not contribute to developmental programmes which require democratic institutions involving people's participation. The theory of formal organization as developed in the field of sociology and decision-making, and

human relations concepts belonging to the field of social psychology have contributed a great deal in the area of administration and supervision in agriculture. The recent trend in the field of administration in agriculture is the emergence of the concept of management with greater emphasis in the area of human relations and communication.

Other recent trends in this direction are the studies conducted in the concept and role of agricultural universities where, within the framework of the formal system, function such as teaching research, and extension have been integrated. But this new system has not worked well in all the States. There has been some controversy in the concept and role of agricultural universities and their relationship with the department of agriculture in the States.

It was, therefore, thought necessary to explore into the concept and the role of the agricultural university and of the director of extension education of the university in particular, as understood by policy-makers, high level officers of the university, and the department of agriculture and others. Various studies were conducted in this field which contributed to clarity and precision with regard to this field of agriculture and education.

Further, to facilitate quantitative studies in the above area of research in agriculture, social sciences took the lead in developing some scales and instruments which could be used for research in extension. These tools have substantially helped in conducting quantitative studies of relevant response patterns of different personnel in rural settings.

Implications

The integration of selected social science fields and extension education has undoubtedly contributed to and enriched the discipline of extension education. However, this integration should not be considered final. Extension, by the nature of its definition, is a technologically-oriented interdisciplinary area and its contribution can be maximized by the extensive use of social science knowledge. Keeping this in view, the nature of integration of the two will have to be on a continuous basis.

Sometimes there is a tendency among specialists of extension

education to claim specialization in certain areas of social sciences as well. This has created a situation of inbreeding. A danger arising from such a claim is that it may deprive the field of extension education from acquiring knowledge from social scientists who are well trained in their respective disciplines. There is no doubt that within the framework of extension teaching and research there is provision for training in the field of social sciences as well. However, such training does not qualify persons to take up the role of social scientists other than in extension education. Encouragement should, therefore, be given to social scientists who have proper qualification, experience, and academic training in their disciplines to join the faculty of extension education. Further, a situation conducive to maximum contribution should be developed. The tendency of inbreeding should be avoided as far as possible in the interest of the future integration of extension education and the allied field of social sciences.

The time has come when careful consideration should also be given to the nature and status of social sciences in the broader context of agricultural education. The two main issues are (a) continuation of social sciences as a supporting discipline to extension education in teaching and research, (b) developing of opportunities for the creation of a fullfledged status for social sciences. In continuation with the latter, there are some agricultural universities which have taken the lead in creating a department of humanities where social science fields such as rural sociology, educational psychology, and agricultural economics have been recognized as disciplines. The observations have shown that people who are social scientists working in the department of humanities are able to conduct both basic and applied researches in their own field, besides contributing and relating themselves to the problems of extension education. This arrangement develops a desire among the social scientists to work in agricultural education more satisfactorily and also allows the social scientists to maintain their identity.

There is a tendency to consider social scientists working in agricultural universities, colleges, and institutes as second grade social scientists since their teaching and research experience are based only on agriculture and its related problems. This image is very discouraging to social scientists in agricultural universities.

Their experience is no way less important than the experience of those social scientists who work in universities. Agriculture provides a greater challenge for the social scientists as 75 per cent of the Indian population live in rural sectors and are dependent either directly or indirectly on agriculture. The problems of poverty, unemployment, malnutrition, etc., will have to be part of the agricultural development programme in the future. This new concept of development in agriculture creates a very challenging situation for the social scientists. The new vistas of research and teaching in the area of agriculture will make an important contribution. Keeping this in view, social scientists must be given greater recognition and be allowed the opportunity of developing their discipline in the context of agricultural development.

COMMENT ON WORKING PAPER I

Kamla Chowdhry

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THE INDIAN COUNCIL OF SOCIAL SCIENCE RESEARCH and the University Grants Commission, in organizing this conference, are expressing a concern about the application of social science knowledge to problems of national significance. In selecting agriculture, engineering, and medical education, they have selected three key professions in which a greater interplay of social sciences with natural, biological, and engineering sciences can result in considerable improvement of the practice of these professions. Professional institutions of research and teaching have a distinctive role in training practitioners and in the translation of knowledge into everyday action. Since the practice of professions is concerned with people, they require some understanding of human behaviour and of social systems to be included in their curriculum.

It is well recognized that the constraints to development are not scientific and technological but social and human. The scientists and engineers need to understand that each technology has its own social system. We cannot have twentieth century technology with only intuitive understanding of social structures and social systems. Our policies and plans often go wrong because not enough attention has been paid to the social and human dimensions of the problems.

In this paper I wish to examine the role of social sciences in agriculture universities, and wish to make some suggestions about strengthening rural social sciences in India.

Social sciences in agriculture universities

Dr. S.N. Singh in his paper "Application of Social Sciences in Agriculture" has provided an excellent historical background

for the emergence of social sciences in agriculture. The paper also indicates the kind of courses and curriculum in extension education, the type of research projects undertaken, and the contribution social sciences have made to the adoption of new technology and new practices by the farmers. Dr. Singh has also gently raised questions about the role and status of social scientists in agriculture institutions, and the implication of these on the growth and development of social sciences in agriculture universities and institutions.

Dr. Singh very rightly, in my opinion, makes a distinction between what should be expected of a social scientist in an agriculture university as compared to a social scientist in a general university. He writes, "It was essential that the discipline of social sciences be taught not merely for the sake of theoretical and academic values, but as applied subjects whose concepts and principles have definite practical value in promoting desirable changes among rural people." This is a very important distinction that Dr. Singh makes. Whereas the teaching of social sciences in the universities is aimed at the acquisition of knowledge, in agricultural universities or in institutions such as the Indian Agricultural Research Institute (I.A.R.I.) the aim is in teaching the *application* or *utilization* of such knowledge. The objective of social scientists in agricultural universities is (or should be) to develop practitioners, that is, people who practise, apply, administer in rural situations, whereas, the universities' objective is the development of social scientists, that is, people who know about social systems, theories of personality, communication, etc. The difference is an important one, the practitioner being primarily concerned with applying what the social scientists have discovered to the solution of problems in the field. Since the understanding and skills required in the *application* of knowledge are somewhat different from the understanding and skills required in the *acquisition* of knowledge, different teaching and learning methods, different types of courses and curricula would be necessary in each case. Because of this failure to distinguish between the aims and objectives of social scientists in universities from those working in agricultural universities or other applied institutions, there is a tendency to select research projects and to teach courses on similar lines as in the universities.

There is also, I believe, a role confusion in social scientists working in applied institutions such as agricultural universities. They think of themselves as sociologists, or psychologists, rather than as applied social scientists whose role and responsibility is primarily as application of knowledge rather than the desire of conducting sophisticated research for testing of hypotheses. Many of the social scientists in applied institutions long for the purity of a discipline (however diluted in quality) instead of the murkiness of an applied frame of reference, and long for their research to be published in professional journals abroad, instead of its being recognized by practitioners in their field.

Dr. Singh mentions in his paper that an ad hoc committee developed a model syllabus for the extension curriculum and suggested courses such as rural sociology, research methodology, statistics, educational and social psychology, etc. These are courses, I submit, for the acquisition of knowledge. They do not provide a methodology for a skilled diagnosis of a given situation and dealing skilfully with a multi-dimensional situation. An agricultural university does not hire a psychologist or a sociologist or an anthropologist for the growth of a discipline; it hires them for utilizing the social science knowledge that they bring for better problem-solving and for more effective decision-making than would be possible otherwise.

Each of the social science disciplines has developed a methodology which aids the disciplinary development. The basic knowledge of the disciplines is not suitable to deal with such messy problems as changing the farmer's mode of doing things. Social sciences in agriculture universities must, therefore, in a very self-conscious way, develop themselves as a tool for finding solutions to social problems. They must develop their own identity. They must develop their own research methodology which is action-oriented and devise teaching methods which help analyse a complex problem for taking action. As a profession they must serve the interests of rural society and not of the academia.

It is, therefore, necessary to raise questions about the syllabus in agriculture universities. To what extent are the courses discipline-based and to what extent are they related to dealing with real problems? Or, as mentioned earlier, to what extent are these courses related to *acquisition* of knowledge as compared

to the *application* of knowledge?

In discussing the research methodology of the social scientists in agriculture, Dr. Singh mentions that in the initial stages most of the studies were non-experimental in nature – tools and techniques such as case studies, field diaries, interview schedules, record consultation, etc. In the second phase there was an emphasis on sampling design and statistical treatment of data. Then came the third stage when psychometric methods were added. Finally, Dr. Singh mentions that the social scientists realized the importance of using computers for effective handling and processing of data.

After reading Dr. Singh's paper, I got the impression that he was suggesting that in the course of time the research methodology of social scientists in agriculture achieved sophistication, maturity, and status, by processing data through computers. Although computers are a useful tool for analysis, it seems to me that, more often than not, social scientists working in institutions with a predominance of physical and natural scientists believe that in order to be scientific (and to achieve status) they must, like their more distinguished colleagues in other departments, examine their material with sophisticated instruments of analysis. The social scientists in "joining the club", perhaps end up by being scientific but not relevant in their analysis. I agree with Professor Roethlisberger that human problems to be brought to a human solution require human data and human tools.* Too often we try to research in human and social problems with non-human tools. We collect data through questionnaires, put them through computers, and arrive at conclusions which have no human and social relevance. I am afraid that social scientists in their zeal to be sophisticated and scientific often lose the capacity to be creative and insightful.

The question that arises in my mind is, do the social scientists in agricultural universities do research, write and publish for other social scientists, or do they write for practitioners, policy-makers, administrators, extension workers, etc.? If they claim that their research is to be applied and utilized or is to influence policy decisions, then it is necessary that their research is conceived and communicated in a form that is under-

*Roethlisberger, F., *Management and Morale*, Harvard University, 1942.

stood by their client system. The social scientists in agriculture universities must ask themselves two simple questions: (1) Who must understand this study if it is to have any effect? (2) Can such people grasp its method and its message? The University-based social scientists can be as obtuse as they want in their research design and publication of results, for after all only other social scientists are likely to read them. But social scientists in agriculture universities must keep in mind their clients – extension workers, farmers, village level workers, etc.

When Dr. Singh talks about social sciences in agriculture, he generally refers to sociology and psychology, and some anthropology. Agricultural economics has a place of its own and at the I.A.R.I. it has a separate department – not mixed up with the lesser social sciences. The absence of political science is specially conspicuous, considering that the social scientists are interested in social change in rural India. The historical reasons for ignoring other social sciences are clear. The social sciences were brought in after the high yielding varieties programme was introduced on an all-India basis. As Dr. Singh points out, “at this stage the need for proper understanding of the farming community in relation to technology became much more imperative”. The social sciences were used for selling (or communicating) the production technology to the farmers. This use of social sciences has resulted in a narrow and restricted development of social sciences. Rural sociology and some psychology, with emphasis on communication, has become the core of social science subjects. However, if social sciences are to be used for contributing not only to adoption of high yielding varieties or other technology, but to rural development, then the scope will have to be widened and some structural changes in the Basic Sciences and Humanities Department and in the Extension Education Department will also have to be considered.

Dr. Singh has very rightly pointed out the dangers of inbreeding in the context of appointing faculty in extension education. He mentions that there is a tendency to appoint persons trained in extension education. Such appointments are based on a narrow concept of the department which has its historical reasons. But inbreeding will, as Dr. Singh implies, weaken the growth of applied social sciences in agriculture universities. Social sciences will need a base which can provide for inter-

disciplinary research, and a type of teaching which focuses on analysis and problem-solving.

It is my belief that agriculture universities and institutions such as the I.A.R.I. where knowledge and its application is considered an integral part of teaching and learning, can play an important role in the rejuvenation of social sciences in India. The "togetherness", of research, teaching and utilization of knowledge in agriculture universities will make teaching there more relevant and, through the teaching of concepts in real situations, will lead to improved knowledge.

Strengthening rural social sciences

India's population is largely rural – about 438 million people live in rural areas. The problem of poverty is also largely rural, about 51 per cent of the rural population is undernourished, 70 per cent of the children in the age group of 1–5 years do not have sufficient calories, and 50 per cent of them do not have sufficient protein. Raj Krishna has estimated that there are 1.93 crores of people unemployed in rural India.*

These are staggering figures indicating the enormity of the problem concerning rural development. Although there is a fair amount of work going on in agriculture it is related to the improvement of "hardware", that is, improvement of varieties, irrigation, cattle, etc. There is not much research going on in the rural social sciences. The agriculture universities, as mentioned earlier, have agriculture economics and extension education, but an integrated approach of rural social sciences to deal with problems of rural development has not taken place.

Considering the need and the importance of the subject we need to give the highest priority to the development of rural social sciences. It is not sufficient that research on social problems is spread out in different disciplines in different universities and institutions. Unless an integrated approach is taken, an understanding of the complexity of the rural problems is not likely to emerge. And an integrated approach is not possible

*Presidential Address by Prof. Raj Krishna at the Indian Society of Agricultural Economics, 1972.

without an institutional framework which can bring together different social sciences in terms of teaching, research, and action.

Rural problems do not fall within the traditional boundaries of different social science disciplines. They require for their solution a focused and a collaborative effort – collaboration between different social sciences, between social sciences and natural and biological sciences, between social sciences and practitioner, and with professions.

I would like to suggest that we consider developing rural social science centres in (1) selected universities, (2) agriculture universities/institutions, by restructuring agriculture economics and extension education departments into rural social science centres, (3) specialized institutions such as the Tata Institute of Social Sciences. Such pluralism is not only desirable, but is also necessary. Several different centres with sharply focused programmes can be organized more effectively than if a single institution were to deal with the many dimensions of rural development. A single institution could mean lack of focus and spreading resources thinly over a wide variety of concerns.

In proposing new centres in any of the above-mentioned settings, the intention is to change the management of applied social sciences. The new centres will not deal with discipline-based knowledge. Each centre will develop links with agencies responsible for policy and action so that development of policy and action can be carried forward.

The proposed centres will have new boundaries around social sciences. Social sciences will include, besides economics and sociology, social psychology, political science, and management science. The new boundaries would permit new definition of problems, new linkages, and new solutions.

If selected social scientists can be provided with appropriate institutional settings and appropriate support, I am confident that significant progress can be made. The proposed centres can become the “High Yielding Varieties” in social sciences.

COMMENT ON WORKING PAPER I

H.K. Jain

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THE PAPER is concerned with the place of social sciences including rural sociology and social psychology in organizing teaching programmes in the field of agricultural extension education. The author argues that introduction of courses from these disciplines has enriched the teaching of extension education. It will be generally accepted that social sciences, concerned as they are with human behaviour, response, and motivation, should provide important guidelines in organizing extension courses. The only question is how much of basic sociology should be included in such courses. The answer obviously is that it depends on the level of teaching and the kind of students for whom the particular course is intended. If it is intended to train the field staff such as the Block Development Officers and associated staff, it is probably not necessary to stress too much on basic theory. It might be more useful to concentrate on the techniques of communicating scientific practices and innovations. On the other hand, if the teaching programmes are intended for post-graduate students who may be more interested in becoming research workers or teachers, a larger content of sociology courses may be desirable. An analogy is to be found with regard to the teaching of courses in engineering sciences. We do not always include a large component of advanced mathematics and physics which provide the basis for the development of engineering sciences.

While there may be differences of opinion in this regard, Dr. Singh's paper does serve a useful role by initiating discussion in an area which has not received adequate attention. Dr. Singh starts his paper with a historical review of the organization of teaching agriculture in India. In my view, this is not necessary. The subject of this paper can be more directly introduced. Also, Singh makes the statement that social sciences

began to receive adequate attention in the context of agriculture largely through the field of extension education. In my view, this is an unfortunate statement. Ever since man took to farming nearly ten thousand years ago, there has been a strong interaction between agriculture and industry on the one hand, and between both these and social organization on the other. This can be seen from the fact that millions of years before the advent of agriculture, man did not succeed in having a settled community life of the kind which we have today. This fact has been widely recognized and there have been major works dealing with the social implications of agriculture. Also, the role of social sciences in organizing teaching in agriculture goes back to a time when agricultural extension education had not developed into the well-defined discipline that it is today.

The paper would require careful editing and revision. Its scope should be limited as indicated above.

REPORT OF THE WORKING GROUP ON SOCIAL SCIENCES IN AGRICULTURE EDUCATION

Prof. C. Dakshinamurthy – Chairman

Dr. Y.P. Singh – Rapporteur

DISCUSSION RECORD

DR. N.K. ANANTRAO, Deputy Director-General (Education), Indian Council of Agricultural Research, who was to present the key-note address did not come. The group started with the presentation of Working Paper by Dr. S.N. Singh. This was followed by the comments on the paper by Dr. (Mrs.) Kamla Chowdhry. Dr. H.K. Jain, another commentator on the paper, was absent. In his absence the comments were read by Dr. S.N. Singh. The group discussed the problem of social science in agriculture at length and arrived at several conclusions.

Roles

Discussing the role of social science in the agriculture setting the group outlined the following roles:

1. To make the students of agricultural universities/institutions understand the social context in which they will be required to work.
2. To develop among the students and the faculty sensitivity to societal needs and the role agricultural scientists and professionals are required to play in response to these needs.
3. To help agricultural universities set up teaching and research goals in the light of (1) and (2) above.
4. To identify the university clientele and to map out their needs and expectations from the agricultural universities.
5. To equip students with such social science concepts and tech-

niques as would qualify them to perform the role of a change agent.

6. To improve the human relations and communication skills of the students.
7. To inform policy-makers of the reality situations and help in policy-formulations.
8. To conduct research on questions relating to the above roles and to take up any activities needing social science expertise which can help in the fulfilment of institutional goals.

Perspective

The group felt that agricultural universities should concentrate on applied social science research only. Social sciences in agricultural universities must squarely face the burning social problems of their client systems and develop themselves as a resource for finding solutions to these problems. They must develop their own action-oriented research methodology and devise teaching methods which help in improving education. As a profession, they must serve the interests of rural society and not of the academia.

Teaching Focus

The teaching of social sciences in agricultural universities must be inter-disciplinary and problem-oriented. The student should be thoroughly equipped to identify problems, find different alternatives to their solution, weigh the alternatives in the context of the goal and the multi-dimensional character of the problems, and derive and implement a line of action.

Degree

Though social science inputs are highly desirable at the undergraduate level, the bachelor's degree should be in agriculture. At the post-graduate level the degree should be awarded only in applied social sciences related to agricultural and rural development.

Organization

Regarding the administrative organization of social sciences, the group felt that all the social science disciplines should be brought under one umbrella. This could be a faculty, institute, school, centre, division, etc., of social sciences.

They also felt that the methodology for the teaching of social sciences in agricultural universities had to be different to the conventional method followed in other universities. It had to be less information-oriented and more experiential. Social sciences teachers should quickly move towards the utilization of practical experience and of field-based teaching materials. It was felt that the use of case methods, incident techniques, field observation, and other techniques of experiential learning should be freely utilized in the agricultural university setting. However, sufficient materials of the required quality were not available at present. A major task of social scientists in agricultural universities/institutions should be to develop such materials as soon as possible. The Indian Council of Social Science Research should help the scientists in this endeavour.

Faculty

Who should teach social sciences in agricultural universities? The group, after examining the factual situation, rejected the comments made in the working paper that there was too much inbreeding in the social science faculty. The group discussed thoroughly the question of composition of the social science faculty and recommended that the faculty should consist of "core" faculty and "adjunct" faculty. The core faculty should comprise agriculture-based social scientists and other social scientists. In the selection of social scientists in agricultural universities/institutions, emphasis should be laid on their commitment to the social scientist's role in an agriculture setting, their interdisciplinary orientation and their training and experience. Weight should also be given to evidence of their flexibility in adapting social sciences in a technological culture.

The group recommended that the position of "adjunct faculty" which was not in existence at the moment should be immediately

developed. Each department should select a few eminent social scientists outside a given university who should be associated for a period of time with the social science programme of an agricultural university. It was further recommended that this system should be flexible enough to permit a diverse pattern of linkages. No prescription was provided for the specific linking mechanism and it was left to the individual institutions and the consultants to finalize the details of such connections. However, it was recommended that the I.C.S.S.R. should provide funds to the agricultural institutions for meeting the expenses for a few adjunct faculty members.

Personnel policy

It is important that social scientists of a high calibre should be recruited, retained, and properly utilized in the agricultural institutions. The existing personnel policy came in the way of hiring and retaining pure social scientists of a high calibre in these institutions. The greater block was caused by the system of mono-professor departments. Since the group had recommended putting the different social science disciplines under one umbrella, it strongly recommended that a system of multi-professors in the social science departments should be introduced. The idea was that as soon as a faculty member would grow to a point when he could not be content in his present position, he should be given a suitable raise. It was in the absence of such a policy that the agricultural system had lost some of its best social scientists. However, the group was equally alive to the fact that this system should not be misused by indiscriminately promoting anybody and everybody who would claim to have grown to the point of promotion.

Syllabus

This should be developed by the faculty with a view to teaching social sciences as outlined in this report. The study team on the teaching of social sciences in professional education would be able to contribute more on this point.

Participants

1. Dr. M.S. Gore (Indian Council of Social Science Research, New Delhi) (on 21st only)
2. Dr. S.N. Singh (Indian Agricultural Research Institute, New Delhi)
3. Dr. H.R. Chaturvedi (Indian Council for Social Science Research, New Delhi)
4. Dr. V.R. Gaikwad (Indian Institute of Management, Ahmedabad)
5. Dr. (Mrs.) Kamla Chowdhry (Ford Foundation)
6. Dr. Madan Lal Sharma (Haryana Agricultural University, Hissar)
7. Dr. J.C. Sharma (Haryana Agricultural University, Hissar)
8. Dr. I.J. Singh (Haryana Agricultural University, Hissar)
9. Mr. K.N. Singh (Indian Agricultural Research Institute, New Delhi)
10. Dr. A.P. Barnabas (Indian Institute of Public Administration, New Delhi).

WORKING PAPER II

SOCIAL SCIENCES IN ENGINEERING EDUCATION

K.N. Sharma

THIS PAPER aims at a diagnostic analysis of the problems of teaching of social sciences in engineering institutions in India. Arising out of this analysis is a policy and a set of programmes. The paper examines the issues of philosophy of teaching of social sciences in engineering institutions, the levels of engineering institutions, content of courses, text-books, recruitment of teachers and their interaction with engineering teachers and students and with the outside world. It may, however, be pointed out, at the very outset, that it is based primarily on my participant observation, as a teacher of sociology at the Indian Institute of Technology (I.I.T.), Kanpur, since 1963. The bias in favour of growth of social sciences is patent, but in my view it is legitimate.

Unfortunately, the idea of teaching social sciences in engineering institutions has been borrowed by India from the West, like most other fads which are prevalent not only in education, but also in other fields. In the absence of any coherent national philosophy or policy for teaching of social sciences in engineering institutions, there is neither a meaningful pattern of teaching, nor a clear understanding of its aims and objectives. The holding of this conference is the first major step in this direction. I do hope it will form a basis for evolving some philosophy and also for formulating a national policy in this respect, since we now have some experience of practical difficulties and a better ground for appreciating the contributions which the teaching of social sciences in engineering institutions can make.

Objectives

I am sure, everybody will reject, at least publicly, that it was borrowed as a fad. Then the natural question is: why are we teaching social sciences in engineering institutions? There could be any one of the following four objectives. Acceptance of each objective entails a certain educational policy in this respect.

The most laudable objective was enunciated by C.P. Snow while pleading for the bridging of two cultures – the scientific, technological and the literary or social-humanistic culture (if we insist on labelling of cultures in accordance with broad disciplinary boundaries). Without repeating all of his arguments one can state that his major concern is with the fact that each culture has a distinct mode of thought, divergent levels and techniques of understanding, and different languages. Each culture has common attitudes, common standards and patterns of behaviour, common approaches and assumptions. Scholars cannot communicate across the narrow confines of their cultures. This has resulted from an emphasis on narrow specialization and can be corrected by exposing students to both the cultures.

If we accept this thesis, we have to face two, or rather three, important questions. First, why is the policy of teaching of social sciences in engineering institutions not coupled with a complementary policy of teaching science and engineering subjects to arts graduates? Some unsuccessful attempts were made in India to expose arts students to science and engineering through what is called “general education”. It is beyond the scope of this paper to examine the causes of its failure. Nevertheless, I would like to point out that it is worthwhile to enquire into its failure in most of the universities. The second question is related to the content of courses. What kinds of courses will be sufficient to bridge the gulf between the two cultures? Should we define the content of courses only from this point of view or should we have other mundane, utilitarian objectives also in mind? It is easier to react affirmatively to the second part.

Among the mundane objectives of teaching of social sciences, one was propounded by UNESCO at its twelfth session held in December 1962. Among its many recommendations for

improving the quality of technical education and for spreading it, there is one which specifically deals with our problem. It holds that in addition to a specialist's knowledge, technicians, engineers, and technologists should study the social and economic aspects of their respective fields in order that most harmonious and effective use can be made of the human and material resources available to them. It suggests that the courses for such students should include general subjects such as languages, social sciences, etc. In other words, it propounds the thesis that the engineering students should be taught such humanities and social sciences courses as are relevant, or as would prove useful to engineers in the performance of their role.

The largest number of engineering teachers in India, who favour teaching of social sciences, are votaries of the above thesis. Their argument is that our primary objective is to train engineers – those who can design things and can develop processes by which a given objective of manufacturing can be achieved – and not to make social scientists or literateurs or experts in public affairs. In the performance of their jobs it is useful to know the economics of their design or process, and the social conditions in which it will function.

Nobody would quarrel with engineering teachers on the above thesis. However, its acceptance also involves a number of questions. The first, of course, is what kinds of courses can fulfil these requirements? Can we offer professionally relevant courses without exposing the student to the fundamentals of each social science discipline? Also should we limit the course offering only to this objective? All such questions on courses we shall examine in detail later. Let me pose one more question. If a social science department in an engineering institution offers only such courses, will it not become a service department? If it becomes one, how can it attract good socialscience teachers?

The third objective of teaching of social sciences is stated by the Education Commission (1964–66), better known as the Kothari Commission. It states:

“Too sharp a distinction, however, must not be drawn between general and technical education. General education should introduce children to the world of work and to an understanding of science and technology. Technology itself is evolving so

rapidly that a student who receives only a narrow and specialized training, to the exclusion of general education in sciences and humanities, will quickly find his skills obsolescent and lacking an adequate base for rapid re-training and ill-fitted for the complexity of the demands of the modern world. Therefore, while all general education should contain some technical education of a prevocational nature, all technical education should also contain an appropriate element of general education.”¹

As I see it, the above statement contains three objectives. One, it does not support any sharp distinction between general and technical education and, therefore, is similar to the bridging-of-two-cultures thesis of C.P. Snow. The last sentence, which is the operative one, makes my contention explicit. The second objective is to make the engineering graduates fit for the complexity of the demands of the modern world. It is similar to the objective of teaching professionally relevant social science courses to them. The third objective, which seems to be different, is to arrest the obsolescence of skills of engineers and to make a provision for an adequate base for rapid retaining through general education. This statement is quite broad and, therefore, leaves unanswered the question of the “appropriate element of general education”, which can help achieve these objectives.

There is another objective linked with general education. A general education, it is presumed, will help engineers become good, well-informed citizens. With their general knowledge about Indian society, its past and present, they would be better able to appreciate public issues than otherwise. This is all the more necessary in a country like India, where the best brains are attracted to science and engineering. If their specialized education is devoid of any exposure to social sciences they may not be able to contribute their mite effectively and meaningfully to the development of Indian society. Chavarria-Aguilar, who formulated a proposal for the Humanities and Social Science (H.S.S.) curriculum for I.I.T., Kanpur, in 1962, stated this objective very succinctly :

“...Its main objective is the education of engineers and

1. National Council of Educational Research and Training, *Education and National Development : Report of the Education Commission, 1964-66*, New Delhi, N.C.E.R.T., 1971, p. 681.

scientists able to assume responsibility and even leadership in the non-professional pursuits of society – pursuits in which a healthy society demands of all citizens, intelligent participation and active commitment. To that end such a curriculum must seek to open windows in the narrow house of speciality in order to let light in from other sources; it must seek to bring the individual student to a world beyond his professional interests; it must seek to keep him informed about and alert to his environment and to his role in it, while providing him with the basic intellectual tools for coping with it. And, perhaps most important, it must seek at the same time to create incentives, to implant in the individual the willingness, the eagerness, in fact, to assume intelligently and effectively the various and increasingly complex roles of modern social man.”²

The last but not the least important objective has emerged most primarily during the past four or five years. During this period it has become increasingly difficult for many engineering students to secure jobs for which they are trained. Many private firms prefer to man their management cadre with professional engineers trained in management techniques. Quite a significant number of students (although it is still in minority at I.I.T., Kanpur) feel that engineering is not the career of their choice. It was thrust on them by their guardians. They feel that if a choice were made available, they would prefer a social science or physical science career. Availability of a choice of career even after entering an engineering institution, without wasting any years, and the increasing new requirements of a private sector for their management cadre, make additional demands on social science courses offered to engineering students.

Which one of these objectives should be chosen, and why? Or, can we integrate these objectives and link them with the levels of engineering institutions? It is difficult to answer the first question. Personally I feel each one of the above mentioned objectives can be chosen on the basis of structural constraints such as the quality of students, finance, and comparative competence of engineering and social science teachers, and the nature

2. Indian Institute of Technology, Kanpur, Department of Humanities and Social Sciences, *Proposal of Chavarria-Aguilar and Comments and Correspondence Thereon*, 1962-65, p. 1.

of training imparted in an engineering institution.

In my scheme I would like to put these objectives into a hierarchy and link them with the levels of engineering institutions. I consider "integration of two cultures" as the highest goal or ideal which can (and should) be pursued at various levels of engineering and non-engineering education. "Availability of choice of career even after entering an engineering institution" can be put at the second level. It requires more resources in terms of teachers, books, etc., than any other objective, as I shall explain later. In the next level we can put "professionally relevant social science teaching", because it circumscribes the course offerings and makes the social science teachers second-rate "citizens", since instead of working in their own right, they become subservient appendages to engineering education. It is a situation in which no competent social science teacher, if free to do so, would like to live. In the last rung I put what is called "general education", which may equip an engineer to become a good, well-informed citizen.

The engineering institutions may be classified into four broad types: engineering institutions which are a part of a university with several other faculties located on the same campus, e.g., Banaras Hindu University and Aligarh Muslim University; engineering universities with social science departments, e.g., I.I.Ts and Roorkee University; engineering colleges regional or otherwise, e.g., Motilal Nehru Engineering College, Allahabad and Harcourt Butler Technological Institute, Kanpur; and, lastly, polytechnics.

I would like to make a distinction between the first two types for the simple reason that in the first category social science and engineering departments exist in their own right on an equal footing, while in the second category social science disciplines are lumped together in a single department which is a part of an engineering institution. This makes a significant difference for the social science teachers both practically and psychologically. One can also differentiate between these two categories of institutions in terms of quality and capacity of teachers, students, and teaching and research programmes, but I would not like to venture into this kind of hazardous comparison. The regional and other engineering colleges are quite different from these two categories of institutions in terms of the

capabilities of teachers and students and also the objectives of training, which give less emphasis to research. Polytechnics are primarily designed to train technicians. In all other respects also they can safely be put into the fourth category.

The objectives of social science teaching in the first two categories of institutions may be a combination of offering a choice of career, and professionally relevant and general education courses. In the third category of engineering institutions professionally relevant courses and general education courses could be emphasized. The last category of institutions may focus only on general education. Before I go into the details of these categories of courses, it would be in order to discuss the constraints on the growth of humanities and social science departments and the receptivity of engineering teachers and students to social science courses.

Indian Institutes of Technology and Social Sciences

All Indian Institutes of Technology have been established under a common legal frame. The Institutes of Technology Act provides the establishment of ten departments – six engineering, three physical sciences, and one humanities (the Act does not mention social sciences). It also, *inter alia*, lays down that these institutes shall be centres of higher learning in engineering, science, and humanities. Obviously it is silent on the details of the disciplines to be included under the umbrella of humanities and social science (H.S.S.) department, the nature of courses and the mode by which the I.I.Ts could also become centres of higher learning in these disciplines. Consequently, the growth of this department in the five I.I.Ts has been uneven. Only at the I.I.T., Kanpur, has this department succeeded in establishing itself with stability and gaining internal and external recognition. However, it still has a long way to go to achieve its growth potential and to contribute significantly to education of engineering students in particular and research in general. There are several in-built structural constraints which inhibit the growth of this department in the I.I.Ts.

The constraints on humanities and social science departments

The legal provision for Humanities and Social Science Department in I.I.Ts does not ensure anything. Faculty recruitment, budget allocation, expansion and addition of new disciplines, research fellowships – in fact for everything – the H.S.S. department remains at the mercy and goodwill of the director and the engineering faculty. This is why there is neither a uniform pattern nor a uniform level of growth of this department in all the I.I.Ts. In all fairness one has to admit that the H.S.S. department at the I.I.T., Kanpur, owes its inception and growth primarily to the vision and commitment of Dr. P.K. Kelkar, its first Director. Of course, in this endeavour he was supported by the American faculty drawn from the nine consortium universities, and some of the Indian faculty. But that it was primarily his own decision is borne out by the fact that he had laid out a plan of expansion for the H.S.S. department at the I.I.T., Bombay, also. By the time this conference is held, extensive faculty recruitment will have taken place.

The other constraint is related to the “discipline-mix” which is desirable in the context of engineering education. There are three facets of this issue. The point is whether the department should have a large disciplinary variety, which may not allow the growth of any discipline to the level of post-graduate studies, or whether it should concentrate on a small number of disciplines, so that each discipline may have an opportunity to grow and the teachers of each discipline may have at least the minimum critical number with whom they can interact. This issue is ticklish, especially in view of a lower ceiling of faculty recruitment for the H.S.S. department at the I.I.T., Kanpur. I think this is true of all I.I.Ts. For example, in 1970 the project ceiling of H.S.S. faculty for the year 1973–74 as well as for 1978–79 was 30, while that of electrical engineering faculty was 48 and 55 respectively.

At one time there was enormous pressure from the administration to increase the number of disciplines in the department from 6 to 10, without a corresponding promise for raising the ceiling of faculty recruitment. The majority of the departmental faculty saw in this the danger of crippling the growth of the existing disciplines. They felt that the proposal would amount

to about 3 to 4 teachers in each discipline and that with this number a post-graduate programme could not be sustained in most of the disciplines. Ultimately the resistance of the departmental faculty succeeded. But the question remains whether it is a sound educational policy to expose the engineering students to only a limited number of social science and humanities disciplines.

The second issue is related to the "desirable" mix of social science and humanistic courses. When Snow spoke of two cultures he had in mind only the humanistic or literary culture, and not the social science culture. Therefore, we have to face the question how best the engineering students can be exposed to both humanistic and social science courses. A related and more difficult question is what disciplines should be included under the rubric of humanistic disciplines. Is history or modern philosophy, with its accent on logic and methodology, eligible for inclusion in the list of humanistic disciplines? We had long debates on the issue but could not arrive at a unanimous verdict one way or the other. But we did agree, at least in principle, that all students should be exposed to both kinds of disciplines for at least one semester each. It could not work out satisfactorily because English literature courses are least popular with students, logic has not been as attractive as one would expect it to be, and we could not add other humanistic disciplines.

The issue of the disciplines to be chosen in the H.S.S. department is most difficult. If we group all the disciplines into three broad categories – languages, social sciences, and humanistic disciplines – we get a very wide choice, which makes the selection all the more difficult. Demands for foreign as well as Indian languages, especially Hindi, have been made. Among the social sciences, economics and management science are demanded most, by both engineering teachers and students. Psychology and sociology, in terms of popularity and professional relevance, come next. But what about anthropology, political science, and history? Which one of these is most relevant? Should we decide the selection of disciplines on the basis of relevance or on the basis of sound educational policy? What is that policy? Similarly, in the area of humanistic courses we face difficult but highly relevant questions. English literature is not popular. Should we introduce Indian and other foreign literatures? If

yes, should these literatures be taught through the medium of English or in the original languages? All these questions are crucial, because no engineering institution can afford to allow a policy of run-away proliferation of these disciplines.

From my experience at the I.I.T., Kanpur, it appears to be difficult to lay down a detailed policy in this matter. Only broad guidelines can be provided. The details can be, and are, filled in as a result of interaction between engineering teachers and students and H.S.S. teachers. Without a broad guideline, however, H.S.S. teachers, sandwiched as they are, may go on fighting a losing battle.

Reaction of engineering teachers

The reaction of engineering teachers to the teaching of social sciences and humanities varies from hostility to studied indifference and cautious welcome. There are very few engineers who are positively wedded to the idea of teaching of social sciences to engineering students. However, it is true that the degree of hostility and indifference which one could perceive among the engineering teachers at the I.I.T., Kanpur, in 1963 has thinned out as a result of our interaction and contribution to the education of engineering students. I have heard of similar attitudes of engineering teachers in other institutions of all types.

It appears that the negative or indifferent attitude is born out of a complex set of factors. By and large, the senior engineers and the engineering teachers in India have not been exposed to social sciences during their training and, therefore, they fail to appreciate its value. In addition, they feel that any emphasis on social science teaching to engineering students implies that their own education is imperfect. So through opposing it they try to re-establish the superiority of the education they received in "those good old days". The other very important factor is that engineering teachers feel that any growth of basic and social sciences in engineering institutions is at the cost of expansion of their departments, because the budgetary pie is limited.

There is a sizable number of engineering teachers who maintain total indifference. I am inclined to agree with Snow in

holding that engineering teachers are basically conservative and, therefore, generally they go along with the decisions of the establishment. They are primarily concerned with their own jobs of teaching and research. As they are not vocal, it is difficult to gauge their attitude. I think such persons are also not positively oriented to the teaching of social sciences to engineering students.

The small minority of engineering teachers is favourably disposed to the teaching of social sciences, but most of them insist that the courses should be professionally relevant. They do not agree with the proposition of imparting general education: they are sceptical about its utility. They would like to be convinced of the fact that general education promotes the bridging of the two cultures and of moulding the students to become good citizens, well-informed about their society and public affairs. I think it would not be a bad idea if a survey of attitudes and styles of life of engineers is conducted with a view to determining the value added by social science education. A comparative study of engineers with and without social science education should be of value here.

Reaction of engineering students

At least we, the social science teachers at the I.I.T., Kanpur, can derive some satisfaction from the fact that the hostility of engineering students, which was apparent in 1963, has given way not only to a widespread receptivity, but also to a demand for opening up of opportunities for choosing a social science career after the three-year period of compulsory courses in engineering, basic sciences, social sciences, and humanities. It may, however, be pointed out that there is a wide spectrum of opinions even among engineering students. The opinions range from a desire to pursue a social science career to an indifference to social science courses. The students indifferent to social sciences are usually weak in writing and/or in the English language.

The majority of students do prefer and demand professionally relevant courses in economics, management, industrial psychology, and industrial sociology. But quite a sizable number like advanced courses in various social science disciplines, which

have no relevance to their future professions. The main reason is that the opportunities for entering the engineering profession have shrunk, while the demand of the private sector for managers with engineering background has increased. This has led to a shift of interest among the students. The other reason is that many students, when exposed to stimulating social science courses, realize that their genuine interest lies in social systems rather than in machines and materials. They feel they have chosen a wrong career, either under the pressure of their guardians or under the impression of better career prospects in engineering. Their own growing maturity helps them in stating unequivocally that they are square pegs in round holes, while disillusionment with career prospects in engineering forces them to choose other alternatives, if they are available. Some of the I.I.T., Kanpur, students have gone to American universities for taking a Ph.D. in sociology, political science, and economics.

Surprisingly, one of the most heartening facts is that the students at the I.I.T., Kanpur, have started commenting on the nature of social science courses. A very insightful observation, shared by many students, and expressed publicly, is that social science courses are conservative. They emphasize the maintenance of the *status quo* in social, political, and economic orders and, therefore, are not in tune with the potentially dangerous crisis situation existing in India today. Social science approaches, whether in the specific area of industry or in the macro area of total society, are too oriented to the maintenance of social order to grasp the crisis which is deepening, and to be meaningfully helpful in resolving it. How many social science teachers in India have realized this? If some of them have, what have they done? The observation of engineering students at the I.I.T., Kanpur, I am convinced, is a major challenge to social scientists in India. I do hope and wish that they rise to the occasion.

I do not have any empirical basis for generalizing the reaction of the I.I.T., Kanpur, students to all engineering students in India. But occasional talks with graduates of other institutions and the examining of answer-books from several engineering institutions gave me the impression that they prefer both professionally relevant and general education courses.

Social science teachers

Before the problem of courses and text-books is taken up, it is necessary to discuss the third most important issue, which is, as far as the problem of this paper is concerned, the core human component, i.e. social science teachers in engineering institutions. There are two divergent approaches to the recruitment of social science teachers.

One approach is to recruit teachers who fulfil the minimum qualifications laid down for the available positions and who have been found suitable by a selection committee. In most of the engineering institutions in India social science teachers are recruited to the position of either lecturer or assistant professor (reader) without any opportunity for promotion to professorship. Such institutions also do not have any programme for post-graduate studies in social sciences. These factors conspire to attract only such social scientists who do not have any motivation for post-graduate teaching or any aspirations for improving their career or who are prepared to join engineering institutions while waiting for other better and more suitable opportunities. Consequently, I think, they have not been very effective in accepting the challenges of social science teaching in engineering institutions and in evoking sufficient interest in social sciences either among engineering teachers or students. A concomitant result is that H.S.S. departments in such institutions have been reduced to service departments. I have seen in some regional engineering colleges (and I think this is the pattern in most of them) that social and basic science disciplines have been lumped together in the same department. Such a situation guarantees that both basic and social sciences shall always remain condemned to service functions.

In contrast to this approach, I.I.Ts in general and the I.I.T., Kanpur, in particular, have pursued a policy of recruiting social science teachers as are highly motivated to a social science career and have proven research capabilities. Such teachers can interact with engineering and basic science teachers on an equal footing. They can also respond to the challenges of social science teaching to engineering students. They help in the acceptance of H.S.S. departments as an equal partner in the task of a broad-based education.

The recruitment of such teachers has its own problems. They may not have a specialization in what the engineers consider the "professionally relevant" areas and may be so committed to their own areas of specialization that they are not prepared to develop professionally relevant courses. Such obliviousness is likely to dampen, if not damage, the interest of engineering teachers and students in social science teaching. But this may not be true in all cases. At the I.I.T., Kanpur, we have developed several such courses, although they may not meet all the needs of engineering students. A small number of teachers in each discipline cannot offer all kinds of courses ranging from introductory to professionally relevant to advanced as well as to post-graduate courses. I strongly feel that offering some professionally relevant courses is desirable not only to fulfil the interest of engineering students, but also to ignite the interest in more specialized and professionally-not-so-relevant courses.

The other problem is that such highly motivated teachers usually demand opportunities and facilities for research and post-graduate teaching not only for the fulfilment of their own academic ambitions, but also for the practical reason of being able to shift to any university, in case they find better opportunity there. The provision for satisfactory post-graduate studies in social sciences requires a much larger budgetary allocation, more teachers in each discipline and more fellowships for research students than are usually available to H.S.S. departments. For all of these the goodwill of the engineering faculty and also of the director is absolutely necessary. At Kanpur we have a Ph. D. programme in economics, philosophy, and sociology. It was approved way back in 1965, in spite of stiff opposition from some quarters, both internal and external. In 1973 the Ph.D. programme in the English language and literature had easier passage through the Senate and its various committees than the earlier Ph.D. programmes.

On the basis of our experience of Ph.D. programmes in sociology, economics, and philosophy, we have felt that a master's programme in these disciplines is absolutely necessary, because we do not get a sufficient number of good quality students as required by our system. But it is not easy to get this approved. The main reason is that the government has fixed the upper

limit of students and teaching positions. The hostel accommodation is also designed accordingly. Under this system if there is any increment in the number of either teachers or students in the H.S.S. departments beyond the number fixed, it will cause a decrease in some engineering or science department, and, therefore, the proposal is very likely to be opposed.

The teachers of social sciences in engineering institutions generally feel neglected. In all the references and reports, I.I.Ts are referred to as centres of higher learning in engineering and science, as if we do not exist at all. If this is repeated time and again in spite of public protests and reminders, it is not only frustrating and humiliating, but also bears ample testimony to the attitude of engineering teachers and administration. There is another type of humiliation which one encounters occasionally. The engineering teachers, on the basis of the number of years (five) spent in acquiring the B.Tech. degree, regard the M.As in social science disciplines as comparable to their B. Techs. By implication, naturally, the Ph.Ds in engineering are superior to Ph.Ds in basic and social sciences and humanities. In addition, the teachers of social sciences and humanities will always be denied higher administrative positions in engineering institutions.

There is another important irritant in the system. More often than not, social science and humanities teachers are reminded, in formal and informal conversations, that their primary task is to teach undergraduate engineering classes. Naturally the teachers in the H.S.S. department are forced to realize that the existence of their disciplines in engineering institutions is for performing service functions to engineering education, and that they cannot survive in their own right. When such arguments are put forward to counteract the demand for an expansion of post-graduate studies, the teachers get suspicious and feel insecure. The demand for post-graduate studies is also opposed on the ground that engineering institutions are not universities and, therefore, it is neither proper nor desirable to develop post-graduate studies in humanities and social sciences. The tug-of-war between the majority of the teachers of the H.S.S. department and the administration over this issue has been long, arduous, and quite frustrating. But it continues, sometimes overtly and sometimes covertly.

The last but not the least important problem faced by social science teachers in engineering institutions is that of relative isolation from the mainstream of social sciences. The I.I.T., Delhi, being located in the capital, and the I.I.T., Kanpur, being the best centre of social sciences in engineering institutions, have gradually succeeded in reducing this isolation. But social science teachers in other institutions suffer more. They have little communication with other university departments and central bodies dealing with social science research, such as the U.G.C. and the I.C.S.S.R., while the imposition of service functions within the engineering institutions generates a sense of insecurity and inferiority. No wonder that they cannot contribute significantly either to social science education or to engineering students or to the development of social sciences.

There is no denying the fact that these frustrating experiences are adequately compensated by several redeeming features. It is a highly rewarding and pleasant task to teach the intelligent and academically motivated students in the I.I.Ts. Their questioning in the classes and performance at the examinations are vastly superior to that of post-graduate students in any university. The freedom to develop one's own courses, the emphasis on and the facilities for research, and above all the negligible number of disturbances on the campus produce an environment in which one can pursue higher studies. In addition, a highly competitive environment at the I.I.T., Kanpur, promotes continuous engagements in research.

The approach to social science course offerings

The development of social science courses for engineering students has been suffering from a lack of philosophy and objectives of social science education and any national science and technology plan on the one hand, and the ill-matched hopes and aspirations of social science teachers *vis-a-vis* engineering teachers and students on the other. Therefore, it is necessary to outline a broad perspective within which the problem of development of courses can be examined.

Since the National Committee on Science and Technology has come out with its "Approach to the Science and Technology Plan", it has become easy to integrate social science education

with this approach. The Committee has laid major emphasis on self-reliance and self-sufficiency, and has suggested a policy of gradual reduction of transfer of imported technology and increase in the development of indigenous technology, keeping in view the prevailing socio-economic conditions in India. In view of this approach, social science education in engineering institutions should aim at two things.

First, and most important, it should aim at a thorough understanding of the ecological, social, psychological, economic, and political conditions operating in India and of the demands they place on the nature of technology to make it most suitable. Several examples can illustrate this. The goal of socialism and the concern for restricting monopoly of economic power demand such designs and processes and would not require huge investment. It is also noticed that there are more strikes in larger industrial undertakings than in smaller ones. Thus, the establishment of small industrial undertakings is necessary. Similarly, an appreciation of the fact that there are a large number of small farmers who have to be assisted in augmenting agricultural production would help in producing appropriate technology. The availability or non-availability and the depletion of natural resources in India in particular and the world in general, the environmental pollution caused by industrial expansion, the bloating of urban agglomerations with unmanageable social, political, environmental, and technological problems, have to be impressed on engineering students so that they may contribute to the solution of these problems. Similarly, other aspects of Indian society must also be made known to them.

If social science education aims only at acquainting the students with the conditions of Indian society, it may not generate the necessary commitment among the engineering students. Thus the second aim should be of generating patriotism and genuine concern for the downtrodden, besides inculcating a pride in the history and destiny of the nation. No education, concentrating only on knowledge, and that too derived from foreign sources as is the case in India, can produce genuine commitment to one's own society. Unfortunately in India, unlike Japan, there has been not only a complete neglect of values in education, but an unplanned accent on foreign training, foreign

know-how, and foreign values, all under the highly questionable slogan of "modernization". This has produced a generation of students and teachers who are by and large aliens in their own society (if at all they happen to return to India after, in many a case, irrelevant training abroad).

The implementation of these aims is a difficult task and one which cannot be pursued in isolation. There are several policies of the government which are not only at variance with the second aim, but which quite often actually undermine it. Such policies have to be scrapped if the government is serious about its profession of self-reliance and self-sufficiency. As this is beyond the purview of this paper, I shall refrain from going into the details.

The philosophy and objectives of social science teaching, which are the main thrust of this paper, have already been stated in the first section of this paper. Here I may restate that there has to be a gradual extension of objectives from polytechnics, emphasizing general education, to regional engineering colleges, concentrating on general education as well as on professionally relevant courses, to engineering universities and I.I.Ts adding the dimension of offering the option of a specialization in a social science career to engineering students. This kind of approach takes care of the cost of social science teaching in relation to the budgetary constraints of each level of engineering institutions and also of the aspirations and concerns of engineering teachers and students as well as social science teachers. It would be in order to refer to the Bhagwantam Committee report which was charged with the responsibility of reviewing the educational programmes at the I.I.T., Kanpur, from 1960-1970. With regard to providing engineering students with the facility to branch out to a social science career, it recommended:

"It would be necessary to start a 'Hybrid Course' which will have the same base up to the 3rd year level, in common with the present 3rd year level of the five-year integrated engineering courses and at the end of the 3rd year restricted permission may be allowed to some students to opt out for courses either

in Pure Sciences, Mathematics or in Humanities.”³

This recommendation was based on a survey of students, the general consensus, the necessity of providing for a choice of career when the students attain maturity and the demands of the Indian economy which require an “all round” executive for industry. Such an integrated programme is imperative in engineering institutions at the apex. They are, comparatively speaking, in a better position to meet the cost of H.S.S. departments. The engineering institutions which are a part of a residential university can integrate engineering and social science teaching, with options for at least a limited number of students in the two faculties. This could perhaps be done with the students of the science faculty also.

The nature of courses

The humanities and social science courses offered by engineering institutions can be broadly grouped under the following heads: (1) Language and Literature, (2) Introduction to Social Sciences, (3) Introduction to Humanities, (4) Liberal or General Education courses including those which deal with the history and problems of Indian society, (5) Professionally relevant courses, (6) Advanced disciplinary courses, (7) Interdisciplinary courses and (8) Sequential courses.

Language and literature

Almost all engineering institutions, except polytechnics, emphasize language courses in English. This is true of American engineering institutions as well. The main purpose of these courses is to equip the students with the English language so that they can communicate with others effectively. Some institutions offer these courses for two semesters, others for one. Nobody would question the necessity of exposing engineering students to language courses so that they can improve their mastery over the language. But if the emphasis is on the English

3. India, Ministry of Education and Social Welfare, *Report of the Reviewing Committee of the Indian Institute of Technology, Kanpur* (Bhagwantam Committee Report), New Delhi, Ministry of Education and Social Welfare, 1973, p. 36.

language and literature exclusively, one has to consider several related issues. First, should we also include instruction in other foreign languages and various Indian languages, especially Hindi? What kind of literature should be taught to engineering students?

I think in this respect the reaction of Robert F. Goheen, President of the Princeton University, to the proposal for a humanities and social science curriculum at the I.I.T., Kanpur, made by O.L. Chavarria-Aguilar in October 1962, when he was a visiting professor, is highly relevant. Goheen, in his letter of January 23, 1963 holds:

"With respect of language and literature, we would wonder if the three hours a week allotted for English are going to be adequate to the goals set forth for it..., additional foreign languages would not rate a high place in our thinking, in so far as we understand the I.I.T., Kanpur, in the Indian scene. We would guess that for a great many of your students work in Hindi should be placed ahead of work in European languages....

On the side of literature we would urge that courses avoid preoccupation with the 'sacred cows' of the English and European literary tradition and seek to focus as much as possible on the literary value of our time. On the other hand, the existence of an institute of higher learning on the soil of India that ignored the literatures of cultural tradition of India would be a shocking anomaly. There is after all, a great deal of excellent Indian literature in English, much of it written or translated by Indian authors. We would think that it ought to prove fruitful to direct a considerable amount of attention to this literature, using translations where need be."⁴

Several others, in the same vein, de-emphasized a heavy dose of the English language and literature in the English and European tradition. Om Prakash, of the History Department of the Delhi University in his letter dated 7 January 1963, pointed out: "...But a majority of the students have neither the time nor the aptitude to study English literature. The result is that a majority of them fail to qualify in the quarterly tests in the

4. Indian Institute of Technology, Kanpur, Department of Humanities and Social Sciences, *Proposal of Chavarria-Aguilar and Comments and Correspondence Thereon*, 1962-65.

subject. A study of dramas by Shakespeare or poems by poets like Grey cannot, in my humble opinion, be of very great use to them. Our main aim should be to enable them to comprehend modern English prose without any difficulty and express their ideas in a systematic and effective way in simple English.”⁵

In addition, the English language and literature as subjects are not very popular with the students either at the I.I.T., Kanpur, or elsewhere, including the American universities. Louis Kamf, writing in the *Massachusetts Institute of Technology Bulletin*, says:

“Students at M.I.T. being oriented toward engineering and science, will not take the importance of the literary tradition for granted...our students are simply being honest about the plain fact that literature is no longer reverently accepted as an important element of our lives. Once we put literature’s cultural pretences aside—and our students have done so already—we are able to bypass the moribund and empty formalisms of the profession of English. Since we cannot depend on the students’ familiarity with the categories of literary criticism and analysis, any subjects we design must meet issues that are central to the students’ lives, to their intellectual and cultural concerns. Only in these terms can literature be a meaningful part of the curriculum at M.I.T.—or anywhere else. Ultimately, we expect that the entire literature curriculum to concern itself with basic human issues, rather than with categories of literary history and criticism”.⁶

I have quoted extensively from the letter of Goheen and also from the *M.I.T. Bulletin* to emphasize that the “sacred cows” of the English language and literature are not worshipped even in the United States, at least so far as their teaching to engineering students is concerned. They have to be secularized and oriented not only to the students’ intellectual and cultural concerns, but also to the problems which Indian society is facing. If a student has the minimum required capability in the English language, there is no need to force it down his throat, unless we also want to perpetuate the belief and reality

5. *Ibid*

6. *Massachusetts Institute of Technology Bulletin*, “Report of the President”, Vol. 103, No. 3, 1967, pp. 286–287.

that it is an essential qualification to join the ranks of Indian elites. The English literature courses can draw heavily on many social science works dealing with social, economic, and political problems. Even a work like Nehru's *Discovery of India* or autobiographies of national leaders could be used in the English literature courses.

Introductory social science and humanities courses

I entirely agree with Chavarria-Aguilar when he emphatically holds: "It cannot be too strongly emphasized that the disciplines ultimately chosen as the core of the social-humanistic curriculum must be chosen as valid and important in their own right regardless of any ultimate and direct value to the engineering and science disciplines. And their independence must be absolutely respected, otherwise the study of these disciplines will be crippled and the student cheated."⁷

If the philosophy of teaching social science and humanities disciplines in their own right is accepted, it becomes imperative that the students learn the language, concepts and frame of analysis of each discipline. Only when they pick up the approaches of each discipline are they in a position to appreciate, understand, and benefit from the advanced courses in each discipline. This is why there is a necessity for introductory courses in each discipline. However, the offering of introductory courses raises several questions.

First, if a technical institution seeks to cover a wide spectrum of disciplines in these two areas, the curriculum can offer no more than a sampling of elementary introductory courses. Only a mediocre instructor will be content to restrict himself to the elements of his discipline year in and year out. Therefore, it becomes necessary to restrict the number of disciplines in the H.S.S. department.

Second, is it desirable and also practical to offer all introductory courses to all students? In the very beginning, i.e. 1963 to 1965, it was possible for us at the I.I.T., Kanpur, to offer all

7 Indian Institute of Technology, Kanpur, Department of Humanities and Social Sciences, *Proposal of Chavarria-Aguilar and Comments and Correspondence Thereon, 1962-65*, p. 4.

introductory courses to all students, because there were only five disciplines and we had in all six semesters of the three-year core programme for teaching these courses. Now that the number of disciplines has been raised to six, while the number of semesters of core curriculum for teaching such courses has been reduced to five, it has become impossible. In this situation the above question has become very significant. If a student wants to take advanced courses in a certain discipline, it is desirable that he be first exposed to an introductory course in that discipline. This leads to the issue whether a student should be allowed to take an advanced course in a discipline in which he has not taken an introductory course. We have not been able to enforce any such rule because of the pressure from students.

There is a possibility which can be tried out. If two introductory interdisciplinary courses—one of humanities and one of social sciences—can be developed, the problem can be resolved most satisfactorily. But it requires sustained work by a team of scholars to prepare such courses and to develop the appropriate text-books for them.

At this point I would like to repeat and re-emphasize that engineering students should be compulsorily exposed to both humanities and social sciences, even if we fail to produce composite interdisciplinary courses in these two areas. The relevance of social sciences is more immediate and more readily demonstrable. The appeal of the social sciences is more direct, since they concern the more apparent areas of human endeavour and achievement. But the humanities, dealing as they do with values, hopes and aspirations, “where the empirical methods familiar to the scientists seem inoperative, are usually more difficult to justify in a general scheme of technical education. Yet it is the study of the humanistic disciplines, which more than any other, leads to the development of values, gives perspective to the whole of an individual’s—and society’s efforts, and provides the necessary knowledge and tools by which the individual can most effectively evolve a point of view.”⁸

Liberal and general education courses

It is rather difficult to define exactly the liberal and general

education courses and to distinguish them from other kinds of courses. A rough and ready criterion could be that they concentrate on certain themes or problems. Usually they avoid theoretical analyses of the themes or problems dealt with in the course. However, they are not concerned with such issues or problems as are directly related to the professional role of engineers. The study of introductory courses need not be a prerequisite for the study of such courses. In this sense they are most suitable for regional engineering colleges and polytechnics. Their resources as well as the time schedule may not allow the pursuit of any one or more of the social sciences or humanities in depth. But they can and should be offered in I.I.Ts and other such engineering institutions also. The content of such courses may vary in both breadth and depth from polytechnics to I.I.Ts and engineering universities.

In this category integrated courses of Indian society, its political structure and social, economic, and political problems may be developed. Similarly humanities courses could also be developed on regional (if not on cross-cultural) literatures of various parts of India, philosophies, religions, etc. A course on Indian history appears to be very useful. It may highlight the essentials of Indian civilization, its problems, and also technological and scientific achievements of Indians.

Professionally relevant courses

The primary concern of engineering teachers is with producing good engineers. When they concede the demand for teaching of social sciences and humanities, they emphasize professionally relevant courses, overlooking the broad objectives of education. They demand courses which can help the engineering students in playing their role as engineers. In this category, courses on industrial economics, sociology and psychology, cost-structuring, labour relations, labour laws, personnel management, econometrics, systems analysis, sociology and history of science and technology, etc., may be included. But if H.S.S. courses are generated in accordance with the engineers' exclusive or even major concern with professionally relevant courses, the H.S.S. departments will be reduced to service functions which are distinct and, more often than not, at variance with what

may be called the "civilizing function". The latter should be the basic objective of courses in humanities and social sciences.

Chavarria-Aguilar in his proposal unequivocally held: "If the disciplines of the social-humanistic curriculum are tailored to meet the specific needs of engineers and scientists in their professional capacities, the purpose of such a curriculum is defeated completely and the student is in a very real sense done a disservice. That is, if the study of Economics takes the form of 'Accounting for Engineers'..., then we may produce slightly better engineers and scientists—to the extent that they can keep books, write intelligible (if not intelligent) letters...but we do not, by any stretch of the term, educate them. And the disservice done to the student is damaging, for it prevents him from thoroughly understanding the disciplines involved, their true relation to his own speciality, and it effectively bars him from bringing his own faculties to bear on problems, of coming to an intelligent conclusion on them; the student will be incapable of developing a point of view and of successfully defending it."⁹

This, however, does not mean that service functions or professionally relevant courses should be totally abandoned. If they are, the H.S.S. departments may fail to create a favourable climate for the acceptance of humanities and social science courses which otherwise are very valuable for general education of engineering students. What is desirable is a balance between professionally relevant and not-so-relevant courses, the balance being tilted in favour of the latter. It may be pointed out in support of this thesis that even in American technological institutions such as the M.I.T. and Caltech the number of professionally relevant courses is very small, probably even as low as ten per cent. In other universities the H.S.S. departments do not tailor their courses according to the requirements of engineering and science students.

Advanced disciplinary and sequential courses

The purpose of offering advanced disciplinary and sequential

courses is to give the student sufficient opportunity to learn one of the humanities and social science disciplines in depth. The sequential courses require the completion of less advanced courses in the subject as prerequisites. There are some constraints in pursuing the policy of offering such courses.

First, in view of the in-built constraint on the number of teaching positions available for each of the social science and humanities disciplines, it is not possible to offer a large variety of courses on various branches of the discipline. Therefore, perforce, the social science and humanities disciplines have to specialize in a few areas. At the I.I.T., Kanpur, we have tried to emphasize the areas of industrial, political, and urban development in social sciences. The philosophy teachers are also trying to specialize in the philosophy of science, social science methodology, besides modern philosophy and logic. I think it is desirable to specialize in areas that are close to science and engineering.

Second, the time available for offering such courses, under the existing dispensation, is also limited. If the first three years of the five years undergraduate programme are spent in offering introductory courses in various disciplines, only three more courses can be offered by each discipline in the fourth and fifth years, because the I.I.T., Kanpur, for example, does not allow the offering of any course in the final semester of the fifth year. If out of these three semesters, each discipline is expected to offer one professionally relevant and one liberal course, only one advanced course can be offered. As a result of this situation our scheme of offering sequential courses has been bogged down at the very inception.

If the Bhagwantam Committee Report regarding the option of pursuing a humanities or social science career after a three-year compulsory or core programme of courses in engineering, sciences, and humanities and social sciences is accepted, we would require advanced and sequential courses. Probably, then, it could also be feasible to offer a much larger breadth of areas in each discipline. In view of the strong demand from students for such a choice and the capabilities of the H.S.S. department, at least at the I.I.T., Kanpur, I strongly urge that this recommendation be accepted and the necessary support be provided by I.C.S.S.R. in collaboration with the Council for Scientific

and Industrial Research (C.S.I.R.) and the Ministry of Education.

The acceptance of the Bhagwantam Committee Report is also in the interest of social sciences for at least two reasons. The students of engineering and sciences will bring to bear their training in quantification and concern with technology and science on the growth of social sciences in India. Besides, it is a fact that in India talented students are generally not attracted to social sciences. If, under the scheme of the Bhagwantam Committee Report, we succeed in attracting a few talented students they would prove much more useful than hundreds of indifferent, disinterested, and academically poor quality students.

Interdisciplinary courses

Technical institutions provide an excellent challenge for developing interdisciplinary courses in social sciences and humanities. The lumping together of teachers belonging to various disciplines in one single department forces them not only to rub shoulders but also to interact academically. Organization of periodic seminars exposes the teachers to other disciplines. Similarly, the necessity for planning and coordination of course offerings brings them together. In addition, the demand for professionally relevant courses, coupled with the necessity for introductory and advanced courses within a limited time, forces the teachers in H.S.S. departments to design inter-disciplinary courses dovetailing on a specific theme (whether industry or urban development) of the problems of contemporary India.

I must confess that at the I.I.T., Kanpur, we could achieve only limited success, in the sense that we could develop only one course on contemporary Indian problems. This course has only thematic and not a theoretical unity and, therefore, is quite good as a general education or a liberal course, primarily for regional and other engineering colleges. I understand that similar courses have been developed elsewhere. If a common course can be evolved, and a text-book is prepared on it, it can serve a useful purpose.

I have attempted to develop a course on Indian society and culture based on the theoretical models of civilization available in anthropology, sociology and history, analysis of Indian history,

and the contemporary political, economic, social and broadly developmental problems, within the available theoretical frames. Such courses can be developed on industrialization, urbanization, and other problems relevant to engineering students.

There are several difficulties in developing such courses, the most important being the commitment and orientation of teachers to their own disciplines, their approaches, theories, and concepts. The other difficulty is the limitation on the number of teaching positions. If four or five teachers are expected to offer introductory, professionally relevant and advanced courses to engineering students, and also to develop their post-graduate programme as well as their own research, it is impossible to pursue this highly relevant and meaningful task.

Allied issues

The offering of various kinds of courses of social sciences and humanities can be so designed and integrated with various levels of engineering institutions as they meet the objectives of education at various levels. Before I present an outline of course offerings for different types of institutions, it is necessary to consider certain issues which are related to social science teaching in engineering institutions.

The first issue is the proportion of humanities and social science course offerings in relation to engineering and science courses. At the M.I.T., Caltech, and other leading engineering institutions of the U.S.A. the proportion is 20 to 25 per cent. At the I.I.T., Kanpur, it is nearly 15 per cent. I would presume that in all other engineering institutions it would be much less than 15 per cent except other I.I.Ts where also it is not more than this. I personally feel it is necessary to set up a national norm of proportion of social sciences and humanities courses for the various levels of engineering institutions. It may vary between 10 per cent at the polytechnics and 20 per cent at I.I.Ts and engineering universities. With an increase in the proportion of social science and humanities at all levels of engineering institutions, it would be much easier to offer professionally relevant as well as other types of courses in adequate numbers.

Second, the weightage of social science and humanities

courses should be the same as that of engineering and science courses in terms of contact hours and maximum marks. In other words, if engineering and science courses are of 100 marks and four contact hours per week, the same should be fixed for social science and humanities courses. Besides, the marks obtained by a student in the latter type of courses should be added for computing his division. Such a parity between the two types of courses guarantees that the students would treat the social science and humanities courses with the same seriousness with which they treat their professional courses.

Third, the social science and humanities teachers should take the teaching very seriously. Teaching these disciplines to engineering students is slightly different from teaching them to social science and humanities students in Indian universities and colleges. The engineering students are comparatively much brighter than their counterparts in the arts faculty in universities and colleges. They grasp the subject very fast. They take copious notes in the class and remember and reproduce the reading material without difficulty. Their answers to examination questions are usually brief, precise, and systematic. However, their ability to express through writing is comparatively poor and they are also habituated to use abbreviations, a habit which is derived from the study of science and engineering subjects.

These characteristics of engineering students entail a heavy responsibility on the teachers of social sciences and humanities. The lectures have to be prepared very systematically and precisely. The students have to be assigned enough reading and writing week by week, so that the work-load of students on social science and humanities courses is at par with science and engineering courses, otherwise they would not take these courses equally seriously. The writing assignments have to be examined from the point of view of not only of presentation of ideas but also of language. If necessary, the assistance of language teachers may be sought for improving the language of weak students.

The fourth major problem concerns the availability of suitable text-books and other supplementary reading material. For introductory and advanced disciplinary courses text-books are available, although even they require improvement in the sense that illustrations of theories and concepts should be Indian

and not American or European. At least for introductory courses, more illustrative material, either in the text-books themselves or in the supplementary readings, is needed for engineering students who are used to analysing and conceptualizing materials rather than social facts. For professionally relevant, liberal, general educational and interdisciplinary courses new text-books are urgently required.

The writing of such text-books requires several things. The I.C.S.S.R. can and should buy the time of a team of teachers drawn from both engineering and non-engineering institutions for writing such text-books. The publication of text-books requires some homogeneity in the course offerings of social sciences and humanities in various engineering institutions, so that larger sales are guaranteed.

Above all, the writing of text-books for Indian students from an Indian point of view requires promotion and acceleration of research in a number of areas, e.g., sociology and history of science and technology, dealing with mutual interrelationship of society on the one hand and science and technology on the other, the problems of self-reliance in technology and import substitution, growth of manufacturing entrepreneurship, obstacles in generating a tendency of self-employment among engineers, problems of management and industrial relations in various scales of industries, etc. In some of these areas some research work is being done, but it has to be further accentuated. Research work bordering on engineering and social sciences is totally neglected. What kind of impact will different designs and processes have on the economy, the polity and the goals of Indian society in particular and on the society in general? Similarly, research is also required to identify the designs and processes which are most suitable and in accordance with political, economic and social constraints, say for urban renewal, industries, small towns. The above examples are only illustrative: there are many more pressing problems requiring urgent attention. Such interdisciplinary research born out of a wedlock between social sciences and engineering will enhance the utility of social sciences in the eyes of engineers and the teachers of engineering, besides contributing to the welfare of Indian society.

Guideline for course offerings

In the absence of complete information about the period of time a student has to spend for acquiring a degree or diploma and the teaching system and proportion of social science and humanities courses in different levels of engineering institutions, it is hazardous to present a detailed outline of course offerings. What is presented below is a broad guideline which may be useful for evolving specific programmes in this respect. For the purpose I have divided engineering institutions into three types: (1) Polytechnics, (2) Regional and other engineering institutes, colleges, and (3) I.I.Ts, engineering universities, and engineering departments located in residential universities, and emphasizing research in engineering.

1. *Polytechnics* : For polytechnics at least two courses are necessary, one in the regional language and literature and the other dealing with major contours of Indian society and its problems.
2. *Regional Engineering Colleges* : They may offer six courses: one on language (English and/or regional); one on regional literature; one liberal general education course – similar to, but with more breadth and depth than, that of polytechnics; one dealing with introductory economics; and two professionally relevant courses, dealing with industrial economics, sociology and psychology, and industrial management and industrial relations.
3. *I.I.Ts, Engineering Universities, and Engineering Institutes* : These institutions may offer as many as ten courses: one dealing with introductory humanities – literature, philosophy, fine art, comparative religions, etc.; two introductory social science courses, out of which one has to be economics; two liberal general education courses, including one interdisciplinary if it can be developed; two professionally relevant courses as outlined above; and two advanced disciplinary courses.

In addition, the engineering students in the third category of institutions may be given the option to specialize in social sciences or humanities after a three-year compulsory or core

programme. The engineering institutes located in residential universities may find it easy to allow their students to take social science and humanities courses along with the arts students. However, the professionally relevant courses may either be the responsibility of these institutes or may be specially prepared and offered to engineering students by the social science and humanities departments in the university.

In order to support such a programme additional support—both material and human—would be required. The extension of this kind of programme to all engineering institutions could be phased and spread over the Fifth and the Sixth Five Year Plan periods. The I.I.T., Kanpur, with its long and successful experience, I am confident, would be willing to help in the development of courses, preparation of text-books, organization of research programmes, and, if necessary, training or orientation of social science teachers working in polytechnics and regional engineering colleges.

At the level of I.I.Ts and engineering universities, extensive and intensive programmes of social science and humanities teaching would require a much larger number of high calibre teachers, and for attracting and retaining them, good post-graduate programmes in various disciplines. These institutions would also take care of engineering students intending to specialize in social sciences or humanities.

For implementing all of this successfully, it is necessary to have a school of social sciences and humanities in I.I.Ts with separate and autonomous social science and humanities departments. I think, and I do hope I shall not be accused of chauvinism, that the I.I.T., Kanpur, could be taken up for experimenting with the idea of a school of social sciences and humanities. It has a well-established tradition of teaching of social sciences and humanities and the H.S.S. department has gained recognition both nationally and internationally. On the basis of experience gained at the I.I.T., Kanpur, or at other places which may be chosen for the purpose, the idea of a school of social sciences and humanities could be extended to other I.I.Ts and engineering universities.

The success of this programme depends on a number of factors. The foremost factor is the acceptance of the philosophy and objectives of teaching of social sciences and humanities in

engineering institutions at the national level. It has to be followed by framing appropriate policies in relation to financial resources, etc. The I.C.S.S.R., the U.G.C. (specially for humanities), the C.S.I.R., the Indian Council of Historical Research (I.C.H.R.), the yet-to-be-born I.C.P.R., and the Ministry of Education at the Centre and in the States have to coordinate the framing and implementation of policies.

In the final analysis, the responsibility for the development of a meaningful programme in social sciences and humanities in engineering institutions rests principally with the teachers of these disciplines working in engineering institutions. But the ultimate success of any such programme, as an integral part of an overall educational effort, "is the responsibility of all elements of the faculty and administration.... An honest commitment to the educational needs of society may compel the engineering teachers to give fresh thought...to the aims of their brand of specialization and to whether these are being fulfilled in the most effective and most realistic manner."¹⁰ The acceptance of the philosophy and objectives of social science teaching at the national level, supported by coordinated action of various national educational councils and commissions, will go a long way towards building a favourable climate for the growth of social science teaching in engineering institutions.

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COMMENT ON WORKING PAPER II

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PROFESSOR K.N. SHARMA's thought-provoking paper has touched upon a very vital area in the overall educational programme of engineers and technologists. The International Commission on the Development of Education rightly observes : "Education follows the laws of every human undertaking growing old and gathering deadwood To remain a living organism, capable of satisfying with intelligence and vigour the requirements of individuals and developing societies, it must avoid complacency and routine. It must constantly question its objectives, its contents and its methods." Professor Sharma's paper is most appropriate in that it has set out to examine the objectives, contents, and methods of social science teaching in engineering institutions.

My comments on the paper are summarized below :

1. The paper has presented in a lucid manner a broad survey of the area to identify the extent to which the demand for social sciences is felt by engineers and technologists.

2. The paper has also focused the requirements to meet this demand in terms of the personnel, relevant teaching material, and research efforts.

3. The constraints on the H.S.S. departments in the I.I.Ts have been broadly classified as (i) restrictions on the growth of faculty strength, and (ii) desirable "discipline-mix" in the department in the context of engineering education. In my opinion, these constraints are not peculiar to the H.S.S. departments and are equally valid to the engineering and basic science departments. It is difficult to be convinced that parity in faculty strengths would simultaneously establish parity in the effectiveness of a department within an institute. The problem of "discipline-mix" is no less acute even in well-established engineering departments.

4. The development of social science courses in the I.I.Ts has been suffering from a lack of philosophy and objectives of social science education imparted to students of engineering and technology. This has largely contributed to the alienation of the students from the H.S.S. department.

5. The existing pattern of social science courses suffers basically from the gap between its contents and the living experience of its students, between the system of values that it preaches and the goals set up by society, between its outdated curricula and the modernity of science and technology.

6. For far too long social science courses have inculcated conventional knowledge in time-honoured categories. This concept is still far too prevalent among the H.S.S. departments of the I.I.Ts. Is not this the time to call for something quite different in social science education? The solution must be sought surely in linking social science education to life, associating it with concrete goals, establishing a close relationship between society and technology, introducing a social science education that fits its surroundings.

7. The students of engineering and technology in India, it would seem, have yet to learn from the experience of industrialized societies. The developing countries, including India, have permitted (or solicited) elements derived from a totally different technological universe to invade their accustomed way of life, speeding their "development". Its dualistic nature seems to be forcing them into a pattern of life in which they are becoming increasingly insensitive to the dangers of cultural and ecological disequilibrium. Technology has jeopardized and is still disturbing the balanced relationship between man and his environment, between nature and social structures, between man's physiological constitution and his personality. Irreversible ruptures are threatening the societies in developing countries. The job of confronting these multiple dangers falls largely on the social science education imparted to scientists and technologists.

8. Professor Sharma has categorized the nature of the humanities and social science courses under eight headings and has offered guidelines for course offerings in different types of engineering institutions. If social science educational strategy is to meet planning requirements, it must be both specific (so as to meet the technical demands of planning, which must be able to

rely on fixed elements) and dynamic, so as to take fully into account the creative process of evolution and innovation, which during operations modifies the basic information known at the outset. Social science educational strategy within an institution can only play its part efficiently if it is constantly related to the totality of aspirations, needs, and resources of the institution.

9. From an examination of the humanities and social science educational strategy proposed by Professor Sharma, it emerges that its guiding principle is linear expansion of systems and the numbers of people involved. "Linear expansion" in the present context is understood to mean the development of an educational system's activity according to the lines of earlier evolution, without modifying its qualitative aspects, such as the configuration of types, the levels and the structures in the system, the teaching personnel employed, the kinds of programmes offered. That is to say, it involves quantitative growth at the various levels by simple extrapolation of the system's past trends. In my opinion, no mechanical extrapolation can yield developments in such a dynamic and living enterprise as social science education. Linear expansion strategies can no longer be justified, from the point of view of either results obtained or their methodology. If the social science educational strategy has to succeed in an engineering institution, the strategy must move from the quantitative to the qualitative, from imitation and reproduction to a search for innovation, from a uniform procedure to diverse alternatives.

10. In my opinion, we must rethink our approach to the problem. We must clarify our ideas concerning the objectives appropriate to our society, the way its structures and environment will probably evolve, and the type of man to be trained. Conclusions on these questions will be closely linked, in each particular situation, to our society's cultural traditions, its way of life, its prevailing philosophies, and its ideological aims. It may seem difficult to lay down long-term political, social, economic, and cultural objectives. The search for non-linear strategies must not be based on extrapolation of past trends, but on an up-to-date concrete analysis of individuals' and groups' needs and aspirations, that is to say, on objectives devised for them not only in their specialized area of education but also in related sectors such as employment, industrial output,

agricultural productivity. They must also be based on other factors such as conditions of life and work, urban development, relations within society, individual aspirations, progress in communication media and techniques, standards of living, and development projects.

COMMENT ON WORKING PAPER II

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IN RECENT YEARS, there have been revolutionary changes in the objectives guiding engineering education. With the growing realization of the incompleteness of modern technical education for producing what the older moralists and educationists called a *whole man*, the founder of the Massachusetts Institute of Technology (M.I.T.) in 1961 felt the necessity of combining the basic elements of liberal with undergraduate professional education. He emphasized that higher education, of whatever form it may be, should enable a person to participate effectively in what is called "the humane culture of the community". Starting with the M.I.T., the basic idea of providing liberal education in technical institutions has been accepted, though the pattern and amount of time devoted to it have varied. In India, the M.I.T. educational philosophy has provided the basis for the teaching of humanities and social sciences to engineering students. The Indian Institute of Technology (I.I.T.), Kharagpur, has been the pioneer in making an effort to implement this educational philosophy in integrating general education with the engineering curriculum in our country. It was stated that "the large scale projects of industrial expansion and rural reconstruction require for their execution technical personnel with imagination and sympathies, with broad human as well as practical outlook alive to the social implications of planning. The objectives of the Institute are, therefore, to foster in its students a spirit of free and objective enquiry, to instil into the minds of young leaders a sense of purpose and help them develop a balanced and integrated personality.

"The areas of professional and general education meet at so many points that no sensible plan of technical education can be framed leaving out altogether the discipline of humanities. The ability to respond to finer values of life and intelligent

understanding of the meaning of the society and the problems of human relationship are no less important than acquisition of knowledge and mastery of skill.”*

Therefore, an effort was made to provide an education which correlates technological training with a broad human outlook.

Providing some general education to engineers came to be accepted as a basic necessity, and getting inspiration from I.I.T., Kharagpur, most engineering institutions in the country started some kind of teaching in humanities and social science subjects. However, most of these programmes have been casual and without any clear-cut objectives, resulting in a lack of interest on the part of students and frustration among the faculty. Prof. K.N. Sharma has been very right in emphasizing that any programme of social science teaching in engineering courses should have clear-cut objectives and be linked with the general educational philosophy. He has rightly outlined four possible objectives of such a programme and has put them into a kind of hierarchical order, linking them with the level of engineering institutions. He has very correctly suggested that the attainment of a particular objective would depend upon the nature of the engineering institution and the quality and size of the available faculty. My own feeling is that in most engineering institutions the programme of social science education has remained haphazard. I would like to emphasize that the faculty of every engineering institution should first be clear about the goals of the programme (which should be determined within the general framework of the fourfold objectives suggested by Prof. Sharma), the felt needs of the professional faculty, the opinions of the engineers already in the profession, and the reactions and expectations of the students themselves. Once the goals of the programme are laid down, the recruitment of social science faculty may be done accordingly and the course content can be formulated within that framework. Very often, institutions have blindly aped the grand model provided by the M I T. and other foreign institutions. It is my feeling that while accepting the general necessity of providing social science teaching to engineering students, every institution has to think

**Ordinances and Regulations*, Indian Institute of Technology, Kharagpur, 1958-59.

out and develop its own programme, basing it on one of the fourfold objectives, the general capacity of the students, and the resources available to the faculty. Every programme has to be "tailor-made". Flexibility should be the keyword in designing these courses.

I have had some experience in organizing and implementing the general education programme in one of the I.I.Ts. My own reaction is that while framing the course content, it should always be realized that the bulk of the students (barring one or two exceptions) are not going to specialize and take advanced courses in any one of the social science disciplines. Whatever the social science faculty may think and do, the interest of students in these courses is going to remain peripheral. Therefore, care must be taken in designing the courses. Any kind of basic introductory course is likely to produce disinterest and boredom. Well-designed, integrated courses are far more likely to be useful and stimulating than a few elementary courses presenting a parade of facts, principles, and ready-made conclusions. After all, the aim should be for the development of a broad outlook, an attitude of enquiry, and a wide perspective which would help transcend the narrow limits of a broad discipline. If a right attitude is created and curiosity is aroused about areas other than professional ones, the genesis of a proper outlook is laid. In designing these courses, the faculty should keep in mind what the poet Coleridge has said to be the main task of a teacher: "We sow the germs of after-growth."

The second point which has to be kept in mind in designing these courses is combining breadth with depth. The first two or three years of the course should provide a general programme, preferably interdisciplinary in nature, giving a general overview for the understanding of man's cultural heritage, social institutions, and implications of technological development. In framing these courses materials and techniques should be drawn freely from different disciplines, laying the foundation for more advanced courses in certain areas during the last two years. Thus, breadth can be combined with depth by having a few broad courses in the first two or three years, followed in the last two years by some sequential courses in specific areas of social sciences which should be offered as electives.

I have also felt the need for an Indian orientation to the

social science courses. There is no use in teaching psychology, sociology, or any one of the other social science disciplines in the abstract, particularly because the student is not going to devote sufficient time to getting the basic background and he is not going to be a specialist in any one of the areas. It was my experience while teaching social or industrial psychology to engineering students, that drawing problems from the Indian scene and discussing the phenomenon of rapid social change and impact of technological advancement on Indian social institutions, such as the resistance provided by caste and what could be called "traditional Indian outlook" and so on, made the course lively and more meaningful to the students. In fact, the students' reaction to these courses was so positive that I had decided to design a second course of a more advanced character on the same lines. Moreover, these courses appear significant to the budding engineers because they are going to function in an Indian setting and are going to play a significant role in bringing about some of these changes. Therefore, I would emphasize that whatever course is designed in the social science subject, the central theme should be India, and whatever is taught should be done within the general context of the Indian social structure and problems.

One of the difficult problems which the department of social sciences in an engineering institution faces is the question of time allotted to it for attaining its objectives. Even at the M.I.T., where conditions are supposed to be ideal, the recommendation of the *Report on Evaluation of Engineering Education* (1952-55) done by the American Society for Engineering Education was that about one-fifth of the curriculum should be devoted to humanities and social studies. But even so, hardly 12 per cent of the time was available to humanities and social sciences. In the I.I.Ts, the situation, as I understand, differs from institution to institution; anything between one-twentieth to one-sixteenth of the time has been devoted to the teaching of courses in humanities and social sciences in various years. The general pattern has been that a little more time is devoted in the first two years and then there is a tapering off in the last two years when the main concern of the students is naturally that of specialization in one professional area. Within this short time available to social science subjects (it should be noted that it is very

little because sufficient time has to be allotted to languages and humanities) there is the problem of what I would call the "balancing" of general education with utilitarian/professionally relevant social science courses. Many faculty members put less emphasis on the former and feel that students react much more favourably if professionally relevant social science courses are offered. I feel that in this respect the social science teachers have to fulfil two roles – that of providing the necessary cultural base through exposure to social sciences, and of giving professionally useful courses such as industrial psychology, industrial economics, industrial sociology to engineers. In fact, I would emphasize that the objective of social science teaching can be achieved only by balancing the two components – the cultural with the professionally relevant social science courses.

Lastly, I would like to say a few words about the general status of social science teachers and the department in an engineering institution. In institutions other than the I.I.Ts, the departments, from the point of view of both organization and number of personnel and courses allotted to them, have definitely been given a second class status. In fact, I have known many institutions where a teacher in one subject, say English, is expected not only to teach his own subject, but also to manage courses in psychology, economics, and the like. Due to the very nature of the situation, much greater skill and grasp of the subject is demanded of a teacher of social sciences in an engineering institution if he is to make any impact on the students. Therefore, this practice of "multipurpose teachers" is deplorable. The programme has suffered because of this casual and stepmotherly attitude in many institutions. It is no use starting casual social science courses taught by individual teachers who are only superficially acquainted with many subjects.

Even in the I.I.Ts and regional colleges where the department of social sciences (along with humanities) is a fairly large one with a strong faculty, the situation is not always satisfactory. These teachers are sometimes looked upon as "peripheral interlopers" on the real business of an engineering institution. The result has been an attitude of indifference or tolerance of the social science teachers by the engineering faculty. As a result, students have also taken these courses less seriously, taking them as a kind of "recess" in their crowded and heavy

programme of engineering and basic science courses. It is this attitude which is partly responsible for not attracting (with some rare exceptions) the best personnel to join technological institutions as social science teachers, in spite of better emoluments and prospects for promotion. They find the courses to be taught trite and less attractive. Some of the I.I.Ts in this country are exceptions in this regard. It is my feeling that if top-level specialists are not attracted to join educational institutions, at least the first two objectives as outlined by Prof. Sharma cannot be attained. Moreover, social science teachers in their attitude towards engineering students should be as demanding about their time and attention as the teachers of engineering subjects. There should be no relaxation of standards either in teaching or in evaluation of examination scripts.

Due to paucity of resources, not all engineering institutions can afford to have strong social science departments. This is true not only of engineering colleges but of many of the regional colleges as well. Therefore, my feeling is that if they decide to embark upon an elaborate social science teaching programme, it would be more advisable to establish collaboration and liaison with the respective departments in the universities where specialists with professional status and competence are available. The institutions themselves may only have a small minimum of social science staff forming the nucleus of social science teaching, and performing what could be called "coordination functions". The I.I.Ts, of course, can afford to have a strong faculty. But even there it has proved to be a costly affair, and the conditions are not always satisfactory.

In conclusion, I would like to emphasize that before embarking on a programme of social science education, the institution should be clear about the level of its objectives, its capacity and the demand on its resources, the type of faculty required, and the facilities it can provide to the social science teachers to maintain their status and competence in teaching. Without proper foresight and planning, offering such courses is a waste of valuable time and resources.

REPORT OF THE WORKING GROUP ON SOCIAL SCIENCES IN ENGINEERING EDUCATION

Prof. P.K. Kelkar – Chairman
Dr. Kamta Prasad – Rapporteur

DISCUSSION RECORD

THE DELIBERATIONS were guided by the following considerations :

1. Proposals for the development of social sciences in engineering institutions should be formulated with respect to their administrative feasibility.
2. The requirements of different types of engineering institutions should be kept in mind. What might be a good model for apex institutions such as the I.I.Ts might not be so for regional or state engineering colleges.
3. The relevance of social sciences for the professional training of engineers in general and from the point of view of providing a base for management education in particular should be taken into account.
4. There was a need to have an academically viable group of social scientists who were in a position to make significant academic contributions and also had job satisfaction.
5. There was a need to develop appropriate types of courses suitable for an engineering institution. These might be different from the traditional social science courses in universities.
6. Encouragement should be provided for research by social scientists so that they would become active members of their profession like their colleagues in the science and engineering departments.
7. Social scientists would not just form a part of the faculty of an engineering institution but also of the community of social scientists in university departments.

After a general review of the different aspects of the subject-matter, the deliberations centred on 3 specific issues, namely : (1) the objectives of social sciences in engineering education, (2) the organizational structure, and (3) the scheme of implementation.

I. The objectives

The participants were aware that enough facts and figures based on surveys of the existing situation were not available. It was also pointed out that no serious discussions had taken place regarding the objectives of engineering education in general in the country. When major objectives were themselves inadequate, it was very difficult to have a clear view of the objectives of a sub-set of it, namely social science education. It was pointed out that a task force established by the Indian Council of Technical Education was looking into the objectives of engineering education and that it would be worthwhile if this group could coordinate its work with the Indian Council of Social Science Research group so that the objectives of social science education in engineering institutions might be taken up systematically on a long term basis. This enquiry should determine the types of work done and the importance of each for a working engineer in different types of organizations. This obviously would take time. Meanwhile, it might be possible to rely on the experience and observation of participants, all of whom were closely associated with engineering education.

In view of the fact that the education of a technologist was not complete unless he had an appropriate background in the humanities and social sciences, to the extent to which this was necessary to provide him the right perspective and outlook to apply his knowledge and skills in the service of man, the following might be stated as the objectives of the role of the humanities and social sciences in institutes of engineering and technology :

It was felt that an important objective of social science education should be *to provide social science components in the professional training of the engineer*. This component might consist of courses in economics, especially production and distribution economics or micro-economics in general, or in

psychological and behavioural sciences. These were illustrative examples. Particular engineering institutions should try to develop a proper combination of courses after taking into account the reactions of the students and the availability of faculty. These courses should constitute the core of social science courses and should be taught in the first few years. The content of these courses should be determined in such a manner that their relevance to the professional training of the engineer is obvious.

This objective was considered very important in view of the role that an engineer would perform in his professional life. It was suggested by one engineering faculty participant that quite often a practising engineer had to spend 70 per cent of his time on non-engineering works such as management of labour, organization of production, decision-making at different levels, etc. At higher levels the role of non-engineering work would increase still further. Social sciences, therefore, should help the engineer to perform these tasks as efficiently as possible. A knowledge of relevant social science disciplines would certainly be very useful in this context.

Another important objective identified by the participants was *to contribute in the educational endeavour which would enable the would-be engineers to become adequately aware of the social context of their life and work*. It was felt that unless an engineer had a fair understanding of the economic and social forces under which he had to live and work, he might not be in a position to make the maximum contribution to social growth and development. He should also be aware of social values and the future course of society and the economy. This was an objective which should be taken into account by non-social science courses also. The engineering courses, for example, could point out social and economic implications of particular technological alternatives. However, it was fairly obvious that this task could be done better by social sciences. Several types of courses dealing with society and culture, economic and political framework, could be taught under this category. The next two objectives were somewhat related from the operational point of view. These were as follows:

To expose the would-be engineers to the methods and concepts of a selected social science or of a carefully identified inter-

disciplinary programme in the social sciences which had a clear interface with technological development.

To develop social sciences, especially those of its sub-branches and/or areas which would thrive best in institutions of technical education, in collaboration with experts in engineering and technology.

Several areas were mentioned as illustrative examples, for instance, urbanization, transportation, resource evaluation, and management, project planning and appraisal, industrial development, regional development, science and technology policy, history of science and technology. Depending upon the availability of resources, an institution could concentrate on one or more of such areas. This would avoid the unplanned proliferation of disciplines such as was found in most of the engineering institutions at present. This type of proliferation had prevented social scientists from making any significant contribution. Research projects and activities around selected themes should form an integral part of the course. Every institution should try to develop some focal points around which it would grow. The priority and preferences of these foci should be guided by resource constraints and other relevant factors in each institution.

The courses should be so planned that the students would begin to acquire a deeper understanding of a particular discipline by taking several sequential courses in it. In certain cases, depending upon availability of facilities, students of technology might be given the option to specialize further in a particular branch of social sciences. It was felt that such social scientists would prove more useful to the country in the tasks of economic development than the traditional social scientists. The students should also have the facilities of acquiring broad based training in social sciences. One could, therefore, think of several streams depending upon the option of students. Facilities for different alternatives should be provided. For this purpose, a reasonable number of courses should be offered after a student had acquired basic training in methods and concepts of selected social sciences.

One final suggestion that was raised was that students taking social science courses should have a pre-requisite of *adequate training in communication skills*. Students entering engineering institutions could be divided into three groups, and based on

their background and capabilities, be given suitable courses. (1) Students who were very proficient in communication skills, for example, those coming from public schools. This group might be in a position to be exposed to social science courses from the very beginning. (2) Students who were very deficient in communication skills. This group should be given two or more courses in the subject. (3) Students in between the two levels. These might be given one course to bring them to the required level of attainment in communication skills. It might be worthwhile to use materials dealing with social sciences or themes on current social and economic problems, instead of the traditional English texts for providing adequate training in communication skills. Such an experiment had been useful at some institutions in the country.

II. Organizational aspects

The furtherance of the above-mentioned objectives would require an appropriate organizational framework. In general, the consensus was in favour of a dual system of organizational structure in which the discipline groups would take care of problems of teaching and research in their discipline and inter-disciplinary groups would be formed for operating the programmes or areas as suggested above. In these groups, there could be persons from engineering departments also. The number of persons should be from five to eight for a particular programme. The organizational structure should be kept flexible so as to promote interaction and growth. Decisions regarding identification of programmes should be made by all the concerned faculty and members rather than by one or two individuals. This was expected to ensure continuity.

The organization of humanities and social science departments should support coalescence of academic interests, disciplinary as well as inter-disciplinary and ensure adequate growth of each area of academic interest so that a viable group of five to eight faculty members was available in each chosen area and professional advancement of faculty members was assured.

The system of rewards should be based on recognition of this type of activity so that social scientists associated with these

groups could hope to derive benefits in terms of promotion. It might happen that a particular faculty member might not be released by his parent department to participate in some interdisciplinary programmes. In such cases, there was need for a change in attitudes. One might also explore the possibility of making joint appointments on a shared basis by two departments.

The recruitment mechanism should be properly modified so that persons in well-defined areas are recruited. A group of social scientists in one area would derive better job satisfaction and would probably be more productive in terms of research and development.

III. Scheme Implementation

Before recruiting new people, specific areas to be developed should be carefully identified, and persons with the required specialization, interested in that area should be recruited. Five to eight persons might constitute a viable team. It was possible to introduce this scheme in all those engineering colleges where five to eight sanctioned posts for social sciences were available. Besides the Indian Institutes of Technology, several engineering colleges might come in this category. More than one area could be developed in institutions having more posts.

In certain places such as Poona, Calcutta, Jaipur, etc., where social scientists were available in university departments, an attempt might be made to take their help on a part-time basis by providing suitable incentives. Here also certain focal points could be identified and necessary help from outsiders obtained.

There might be some places such as Jorhat where the engineering colleges had no resources of their own to provide for a viable social science department and where the other institutions also did not have good social science departments. Problems of such institutions (of which there were few) might be tackled on a different footing.

Efforts should be made to invite distinguished social scientists from other places to engineering colleges even for a short period of time to work as catalytic agents and to channelize the academic growth of social sciences into well-defined areas.

All facilities that were usually available to other departments

should be made available to the Humanities and Social Science departments also. In this connection it was pointed out that the Quality Improvement Programme (Q.I.P.) of the Ministry of Education and Social Welfare would not operate in the field of humanities and social sciences. It was recommended that this programme should be extended to social sciences also. Efforts should be made to identify some engineering institutions which had the necessary expertise and facilities for this purpose.

Since social sciences would depend mostly on libraries for their growth, it was necessary to adopt a more liberal attitude while allocating funds for library development. When a new social science discipline or some inter-disciplinary programme was introduced for the first time, it might become necessary to provide a capital grant to acquire books and back volumes of journals. The normal library grant would be grossly inadequate for this purpose. In the absence of library facilities, social sciences in engineering institutions would not be in a position to grow, and they would tend to acquire inferior status. Some of the facilities, especially with reference to the library, could be developed on a collaborative basis with some university departments wherever they existed in close proximity, such as in Delhi, Poona, or Calcutta.

The problem of suitable text-books was identified as a very serious one. The new types of courses that were being visualized would require different types of text-books compared to those that were usually prevalent in universities. No attention had been given to this aspect until now. It was recommended that special measures be taken to encourage the publication of text-books suitable for teaching of social sciences in engineering colleges.

Adequate provision for lecture and tutorial hours might be made for this purpose. This would obviously require allotment of more time and weightage to social science courses. It was pointed out that humanities and social sciences constituted about 20 per cent of the engineering curriculum at the Massachusetts Institute of Technology. Details of weightages and hours might vary from institution to institution.

Several other related points were also mentioned by participants but could not be discussed or elaborated upon in such detail on account of paucity of time. Important among these were the following: (a) current status of social scientists in

engineering institutions and measures to improve this, (b) need to develop one or two centres of excellence in social sciences in engineering institutions, (c) the question of availability of suitable social scientists for these institutions, (d) the possibility of inter-institutional exchange of faculty, and (e) case for one additional year for management for those interested.

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M E D I C I N E

SOCIAL SCIENCES IN MEDICAL EDUCATION : AN OVERVIEW*

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THIS is an exploratory effort to review the status of social science teaching in medical education, with a view to offering some suggestions for identifying important components of social sciences that need to be integrated into medical education, and ways and means of meaningfully teaching it. The role of social sciences in medical education cannot be properly appreciated without prior examination of the philosophy and the objectives of teaching social sciences to medical students. From a broad examination of the philosophy one has to review the objectives in relation to the level of medical training, and thereafter delineate curriculum and course content, needed text-books, teaching material, and teachers. This review has been drawn mainly from available literature in terms of policy level committee reports, reports of medical education seminars and conferences, and from a selective appraisal of Indian and foreign journals, primarily related to medical education. To supplement the documented information, the author has interviewed a few faculty of the departments of preventive and social medicine in medical colleges. Selective use of such insights has been made in the paper.

The framework of the review broadly covers the following dimensions:

1. Overall philosophy and objectives of teaching social sciences in medical education.

*Paper revised prior to publication, 1975.

2. Extent to which the demand for social science is felt by the medical profession.
3. Existing social science capability to meet this demand in terms of trained personnel, teaching material, and researches.
4. Reactions to social science teaching by medical faculty, students, and other social scientists.
5. Suggestions for promoting social sciences in medical education in terms of training of teachers, preparation of teaching material, and identifying areas of research.

Philosophy and Objectives of Including Social Sciences in Medical Education

One of the problems bothering administrators and policy makers has been a constant but widening gap between technology and the social system. Apart from its broader philosophical implications this gap has tremendous implications for the quality and outcome of all technical and professional education and its impact on society. Advances in science and technology have grown geometrically but vertically without any horizontal integration with other contemporary systems and social realities which provide the operational milieu for all technology. Such a lopsided development has resulted in a deep concern among educationists for making education need-based rather than exclusively technology-based. In the field of medicine, the knowledge and information explosion on the technical side has grown to the point of saturation but its operational relation and relevance to social factors, forces, and realities is far from adequate. As Prof. Wahi expressed in his presidential address to the Seminar on Behavioural Research on Health and Medical Care in 1972, sponsored by the Indian Council of Medical Research, "An understanding of human behaviour holds the key to the success of health programmes. There has been substantial advancement in medical technology but much remains to be known about human behaviour. We are still not able to explain the apathy and even resistance to health programmes by many people in this country. The improvement in the living standards of any community depends to a large extent on the active and willing participation of its people."

Tiwari, tracing the progress of modern medicine identifies four distinct epoches in the progress of medicine over the past 150 years. He mentions the transition from the traditional empirical age to the bacterial, laboratory-based era, to an era of biological research, and thereon to a shift from the organ to the man as a whole. "These were the first glimmerings of the patient being viewed as a social entity in an environment acting and reacting with each other. The concept of environment was, however, rather limited. The search for tools for prevention of disease began to be intensified, the science of medicine moving into a closer kinship with many allied sciences. . . . It was the entry of social sciences in a big way that distinguishes the present epoch from the preceding three. The individuals ceased to be looked upon as so many islands and social dynamics began to be pressed into service."

The objectives of medical education have to be formulated and implemented in relation to what we want a doctor to become, what roles and duties are expected of him in view of his training and society's needs. As John Bryant says, "The role of the physician in the developing world is largely shaped by the setting in which he works, the diseases and the conditions under which they occur, the sharply limited resources, the system for providing health services, the capabilities and limitations of other members of the health team." The real question is, do we have a realistic description of the type of doctor needed in India? Way back in 1946, the Bhore Committee recognized the need for two types of doctors: (1) somewhat less trained doctors; and (2) a "basic doctor" – a very well-trained person who is well equipped in the community and preventive aspects of medicine. The Mudaliar Committee (Health Survey and Planning Committee – 1961) recommended general practitioners. Time and again several committees, conferences, and policy-laying bodies such as the Medical Council of India have examined the issue of medical education, its curriculum, methods of teaching, subjects to be taught in pre-clinical, clinical, paraclinical, and internship periods. Such forums have also commented in passing upon the duties and functions of a doctor. But nowhere in these deliberations and recommendations do we find a holistic approach to medical education, coordinating meaningfully the philosophy, objectives, teaching methods, professional goals,

role expectations, and anticipated outcomes of such education with the overall socio-economic framework within which doctors function. Many experts seem to be aware of this lacuna and have reflected their dissatisfaction about the professional education of doctors in different forms from time to time. Mahajan observed, "The medical graduates whether qualified in Boston, London or Delhi, are urban-biased, hospital-dependent and disease-conscious, in other words, they are not prepared for the needs of the developing society." Allan Cregg, making a report to the Government of India, stated, "Medical students in India were badly selected, undertaught, and overexamined. There were too many students and too few teachers and the curriculum was not purposeful and co-related." In one of his forceful papers on this subject, Bhatia asserted, "The lack-lustre performance of primary health centres, the routine-perfunctory style of functioning of most general practitioners in the urban communities, the escalating problem of brain drain or flight of medical manpower to western countries and rapidly mounting dissatisfaction of doctors with working conditions in public hospitals; all of them underline the lack of correspondence, nay clear divergence in training objective and methods and the professional competence expected of the products of such training." In an insightful analysis of the situation Tiwari states, "The spectacular advances in medical science and technology which have vastly increased the capacity of medicine as a whole, have also brought a relative decline in the capacity of the individual doctor. . . . Specialization has not only generated serious problems of organization and financing of medical care services but has also threatened and in any case eroded the role of the general practitioner." In the same vein, the changing interpretation of concepts or images once considered ideal poses problems in the context of changing expectations. While the Bhore Committee (1946) explained the concept of a "basic doctor" as a very well-trained person, in a recent forum of medical educators deep concern was expressed that in "our quest to produce a basic doctor, we may make him so very basic that he may be equated with a quack" !

The general education objectives and components of medical education have remained in the margin and received very little attention from the professionals. It is worthwhile noting that

in 1968 the Union Public Service Commission pointed out that medical graduates and those with post-graduate qualifications who came up for interview, did not know the basic facts and this called for assessment, review, and rectification. The need for bridging the widening gap between medical technology and the social system was highlighted by the Education Commission's report (Kothari Commission). Some medical experts have also felt that the early years of undergraduate medical education must be devoted to general education with some beginnings of clinical training. However, this aspect has not been sufficiently documented. The broad understanding seems to be that while the undergraduate training is mostly for professional education with the more general and somewhat utilitarian objective of helping the doctor to perform his role, post-graduate education is the cut-off point for specialization where the main objective becomes the preparation of a highly specialized physician. This specialization, however, should not result in his lack of adjustment to operative social forces and factors in health institutions and in communities.

A third set of objectives of medical education (just like any other professional education) seeks to equip doctors for non-professional, social, and community roles. Like school teachers, doctors often have to play a leadership role in several social and community activities, although such activities do not bear a direct relationship to health, health problems, or the physician's role. This aspect of the doctor's role and the needed preparation at the undergraduate level has not received such attention. It is interesting to note that a few studies conducted by the Indian Institute of Population Studies on the leadership potentials of doctors in family planning indicated that doctors played a crucial role in communication, education, as well as the service aspects of family planning. The credibility of the doctor as a source of information and communication about family planning can be exploited to the advantage of the programme. Exploration of non-professional roles of doctors, utilizing them for community welfare and formulation of non-professional objectives of medical education has not received sufficient attention of administrators and professionals. From the foregoing discussion the following conclusions emerge :

1. The objectives of medical education have not evolved over

a period of time in line with the changing social-economic factors and community needs. This observation is true of both undergraduate and post-graduate medical education.

2. The general education components of medical education have not received any attention so far.

3. Preparation of medical men for non-professional and community welfare roles has been very much neglected.

Lack of clear-cut formulation of the general, professional, and non-professional objectives of medical education seems to have resulted from several factors. One factor seems to be the elitist approach to the medical profession in terms of the upper social class bias in the recruitment into the medical education system and the common elitist culture shared by the medical teachers and students alike, which results in the perpetuation of the elitist culture and the technology-oriented, disease-oriented rather than society- and man-oriented approach to medical care. No wonder medical education and practice are divorced from rural life and lack social orientation. An additional problem in the formulation of objectives for medical education is the absence of consensus on what sort of a doctor we need to produce. Is it a "basic doctor", is it a "general practitioner", or is it a "community doctor"? The deliberations of the several committees have created more divergent opinions rather than a consensus. The next series of questions one would like to ask relate to medical education in relation to the social, economic, cultural, and political conditions of Indian life. In a country 80 per cent rural, only 20 per cent of medical manpower is available in a sporadic manner in rural areas. Even then, most medical care practised in rural areas is hospital-based, clinical-based, oriented to urban values and highly Westernized. There is very little in rural medical care that is really based on the socio-cultural realities of the Indian population and their health needs. While the technological aspects of medical science may be borrowed from the West, it is important to retain the traditional, Indian cultural background in the practice of medicine in India. Thus, it is important to equip the doctor to gear himself to the realities of the social environment in which he is to operate. Hence the need to provide a proper social and community orientation to medical education. It is in this context that the teaching of social sciences in the medical curriculum assumes

importance. An additional cause or concern is the lack of dynamism in medical training. Considering the major social, economic, cultural, and political changes that India has undergone in the past two decades on the one hand, and the relatively static medical curriculum on the other, the conclusion seems inevitable that medical education is not sufficiently society-oriented. Both the general education and the professional education objectives of medical education need radical re-thinking and a flexible approach. A first step in this direction is a clear-cut statement on the role of the doctor in relation to community needs. The next step is to analyse the medical education curriculum, teaching methods and materials to evaluate to what extent these learning experiences contribute to the preparation of a doctor for the roles expected of him/her. A further step is to find persons who can render such a content meaningfully, with due orientation to medical education.

With this as a background, it may be useful to review the evaluation of social science teaching in medical education. One of the useful purposes to be served by this review is the gaining of a rough estimate of the demand for social sciences as felt by health professionals at different points in time.

Demand for social sciences in medical education

Documented evidence is available to indicate that health professionals have been concerned for a very long time with the inclusion and continuous improvement of the social science components of medical education. Possibly this is the result of an appreciation of the complex interaction of a physician with a patient as a human being who has personal and social attributes, increased establishment of the fact of psychosomatic interaction (body reacting on the mind and vice versa) with the increase in psychosomatic diseases such as hypertension, asthma, etc., and a realization that the socio-cultural milieu of a patient conditions his attitudes, values, beliefs; and reactions to health, sickness, and health care. This is also a consequence of the advances in scientific medicine which have resulted in a considerable degree of success in dealing with acute sickness, and have simultaneously brought to the forefront chronic diseases,

involving long-term adjustments of the patients' social roles. Physicians treating chronic illnesses soon realized the importance of human motivation and social behaviour in solving the problems. Psychiatric illnesses more clearly brought out the need for understanding behavioural and social factors to analyse the etiology of mental illness and plan the needed therapy. The advances in preventive medicine and public health brought into focus more sharply the need for changing attitudes, beliefs, customs, and practices of entire communities for the successful introduction of preventive measures. With this enlargement of the scope of medicine, organization of medical care grew in complexity, necessitating thereby the understanding and application of social science concepts such as team work, group work, group practice, etc. These factors have entailed a need to examine the role of social and behavioural sciences in medical education and to see to what extent medical training equips a doctor to deal effectively with the patient as a human being.

In India and outside, several committees entrusted with the task of examining medical education, while making observation on the content, mode of delivery, teaching personnel, etc., have recorded their thoughts on the social science components and aspects of medical education. A few of them are reviewed in the following paragraphs. For a more detailed review the reader is referred to a status paper prepared in 1971 by S. Chattopadhyay.

The earliest reflections on this subject are contained in the report of the Health Survey and Development Committee (popularly referred to as the Bhore Committee after its Chairman) of 1946, which recommended two simultaneous courses of action (*i*) to produce a somewhat less trained doctor and (*ii*) to produce a "basic doctor", a very well-trained person who is well equipped in the community aspects of medicine. Noting the weakness of the then existing medical curriculum, the Committee stated, "The emphasis laid on the teaching of preventive medicine and public health in the medical student's undergraduate course is quite inadequate. . . . As far as we are aware, in no teaching institutions are the practical and applied aspects of preventive medicine placed before the student in such a manner that he can assimilate them and appreciate fully their importance both to the individual and to the community. In the teaching of the subject the student can and should be

brought into contact with those environmental and social conditions which largely influence ill health in the individual and in the community and it is only by doing so that the medical student will be properly equipped for his future responsibilities as a doctor and as an adviser to people on all matters related to health."

In this quote the last phrase is crucial, as it emphasizes the non-professional role of the doctor as an "adviser to the community". The Committee recommended the establishment of a department of preventive and social medicine in every medical college, "so as to give the student insight into social health problems by contacts with home and community life". The Committee also recommended that a course of lectures in elementary psychology should be given towards the latter half of the pre-clinical training.

It is significant to note that these thoughts and recommendations of the Bhore Committee roused in medical educators a deep concern to examine the non-clinical knowledge, attitudes, and skills of the doctors in the pre-clinical, clinical, and para-clinical training. In this sense the Bhore Committee report was a pace-setter in the critical appraisals of medical education. The first World Medical Education Conference of August 1953 followed suit in recognizing the importance of preventive and social medicine in the training of physicians.

A conference on the teaching of preventive and social medicine was held in 1955 with the aid of the Rockefeller Foundation. The conference recommended that full departments of preventive and social medicine (P.S.M.) must be started in medical colleges, with a full-time professor and other staff including a statistician, that preventive and social medicine should be taught over the 4-5 years of the medical studies, and a total of 50-80 hours in the pre-clinical training and 60-80 hours in the clinical training must be devoted to the teaching of P.S.M. Among the several measures recommended by the conference to initiate the medical student to the concepts of "community", some important ones were: community health and prevention of diseases, planned field experience, participation in health surveys, family-based investigation, follow up of active T.B. cases, etc. The conference attempted a definition of preventive and social medicine as, "the science and art of preventing

disease, prolonging life and promoting physical and mental health and efficiency. Public health was considered as a part of Preventive and Social Medicine requiring organized community effort or action."

Using this experience, the first All-India Conference on Medical Education (1955), after its deliberations recommended that :

1. Each medical college should have a P.S.M. department with full-time staff.
2. The teaching of P.S.M. should start from the very beginning and continue throughout the period of training, including the period of internship.
3. The functions of the P.S.M. departments should be integrated with the teaching in other departments. A co-ordinated out-patients service may be developed in which students accompanied by medico-social workers follow the patient to his home and study social and environmental factors related to illness. This will be rendered into a meaningful learning experience by reviewing the entire experience in an interdepartmental seminar.
4. The P.S.M. department should have rural and urban health centres which will give the necessary facilities for rural training and serve as laboratories for students to study community health problems.
5. A separate examination in P.S.M. should be conducted in the final M.B.B.S.
6. In order to orientate the student in psychological medicine, teachers should emphasize the psychological and social influences on illness.

Two other conferences – the Medical Education Conference of 1958 and the Conference of Deans and Principals of Medical Colleges held in 1960 – did not go into any great detail on the organization of social science components of the medical curriculum, as their objectives and focus of discussion were very different. One of the sub-committees of the Conference of Deans, however, did recognize that many of the recommendations of the earlier conferences could not be implemented due to paucity of resources and trained medical manpower particularly for

teaching sociology, statistics, etc. However, the sub-committee recommended that at both state and Central government levels, special committees must be set up to deal with problems of medical education and research continuously, and that research activities must be enhanced in all teaching institutions.

The Health Survey and Planning Committee (Mudaliar Committee) (August, 1959 to October 1961), while reviewing the status of medical education in India, identified some of the shortcomings and the causes behind them. The major problems noted by the Committee were :

1. Insufficient knowledge of humanities on the part of students, and,
2. Gross inadequacies in organizing the internship training programmes.

The preamble to their recommendations stated, "Medical education should fit in with the needs of the country and the conditions obtaining there. For instance, India being more than 80 per cent rural, the training given to a doctor should enable him to carry on this work among the vast masses in the villages." Some of the recommendations made by this Committee are :

- (a) The period of clinical training should extend to three and a half years, the first six months being devoted to subjects such as elementary statistics, introduction to psychology, and sociology.
- (b) Increased importance must be given to paediatrics, preventive and social medicine, and mental diseases.
- (c) P.S.M. departments must provide orientation to students in public health.
- (d) The students must receive proper orientation to rural health.
- (e) Ways and means of improving the teaching in the Out-Patient Department to students must be worked out.

The net result of all these activities and deliberations was the setting up of the Indian Association for the Advancement of Medical Education in 1961, a voluntary association which aimed at the task of improving the quality of medical education in the country.

While the concern for the inclusion of social and behavioural sciences in medical education was deeply felt in India, similar concerns were reflected at the international level, as exemplified by three contemporaneous publications of the World Health Organisation, Public Health paper No. 9 (1961), dealing with "teaching of psychiatry and mental health"; the Ninth report of the expert committee on mental health (1961), dealing with "undergraduate teaching of psychiatry and mental health promotion"; and W.H.O. public health paper No. 20 (1965), which dealt with the "preparation of physician for general practice". All these publications emphasize in clear terms the importance of social and behavioural sciences in medical teaching.

The sub-committee of the Medical Council of India, while reviewing the undergraduate medical curriculum in 1961, recommended that :

- (a) Throughout the 5-year period of medical training the teaching should focus on preventive and promotive aspects of health.
- (b) During the pre-clinical course the subjects (i) Normal psychology, (ii) Introduction to social medicine and environmental factors pertaining to health, and (iii) introduction to statistics, must be taught.

Thereafter, at varied intervals the Medical Council of India and the Indian Council for Advancement of Medical Education have held various conferences and seminars to review medical education, for its quality, content, duration, and its overall relevance to the changing social structure and community needs. In November 1964, the Medical Council of India organized a conference to review post-graduate medical education in which the M.D. course in P.S.M. of the All-India Institute of Medical Sciences which included considerable course content on social sciences, social psychology, and mental health was highly commended.

The National Institute of Health Administration and Education (N.I.H.A.E.) was established in 1964 to fulfil the growing training and research needs in the area of health administration. In 1965 the N.I.H.A.E. organized a conference to consider the teaching of preventive and social medicine in relation to the

health needs of the country. In addition to accepting the curriculum recommended by the Medical Council of India in 1964 the conference recommended that the topics of genetics, eugenics, and psychology may be taught in collaboration with the university departments and that there should be a separate and full examination in P.S.M. In view of the changing health needs of the country and the need for the physician to provide comprehensive health care, the conference recommended that:

- (a) Medico-social units be established in O.P.Ds to study social and epidemiological aspects of disease extended into the community.
- (b) Preventive and social medicine departments should have access to the hospital patients for study and demonstration purposes.
- (c) The social and environmental history, type of services available and used by the patients be recorded while taking the history.
- (d) Family follow-up of case studies be carried out in collaboration with other departments.
- (e) Clinico-social conferences be organized in collaboration with clinical departments to demonstrate the social aetiology of disease, natural history of disease process, levels of prevention that can be practised, and the clinical and preventive approach that can be utilized to deal with the problems of the community.
- (f) Students must be familiar with the health services provided by the community.
- (g) Participatory methods of teaching such as group conferences, symposia, etc., must be increasingly used and the use of didactic lectures minimized.

The other recommendation of this conference was that there should be joint and integrated teaching between different departments and with pre-clinical and para-clinical departments.

During this period, in addition to the broad subject and course content of the medical curriculum, need for innovative teaching methods was increasingly felt. The Asia Regional Office of the W.H.O. organized workshops in four places on teaching methods in medical education from 15 November to

22 December 1965. These workshops demonstrated teaching methods like clinico-pathological conference, integrated seminars, etc.

The Third Conference of Deans and Principals of Medical Colleges in India, held in 1967 at Delhi, discussed primarily the inclusion of family planning in the undergraduate and post-graduate medical curriculum. It recommended the setting up of committees by medical colleges to draw up a balanced curriculum with due emphasis on extra curricular activities. Four other recommendations of this Conference which are of relevance to this review are :

- (a) There is a need for orienting existing teachers in medical colleges to the social and preventive aspects of health care and community health.
- (b) Operational research must be conducted on the advantages and disadvantages of pre-medical education being conducted in medical colleges vis-a-vis the science colleges.
- (c) In training medical teachers, emphasis must be given on services, training, and research, and workshops must be organized to train teachers in medical colleges.
- (d) Health education and social sciences including psychological, social, and anthropological studies must be introduced as subjects in the undergraduate medical curriculum. Teaching of these subjects should be done by departments of preventive and social medicine.

A few significant trends emerging from these recommendations are :

- (a) The dynamic concept of curriculum, an appreciation that it needs periodical review.
- (b) Concern for social science orientation of existing teachers.
- (c) Recognition of the role of research in choosing alternative locations of pre-medical training.
- (d) Recognition of the need for training in teaching techniques and research for medical teachers.
- (e) Identifying personnel to do social science teaching.

The need for teaching social sciences in medical training

was reviewed by a W.H.O. study group in December 1967. This group, while recognizing the importance of teaching social sciences in order to orient the medical students to community problems, also cautioned that further research and deliberations were essential to suggest the social science content to be taught. The deliberations of this group are significant as an initial effort to recognize that inclusion of selected social science subjects must be based on research findings rather than on intuitive wisdom and *a priori* judgement. In 1967, the N.I.H.A.E. was given the task of proposing a pattern for diploma courses in community health and revision of course content of the D.P.H. courses. The committee collected opinions through various sources and placed its recommendations before a workshop on post-graduate education in community health, held in 1969. The workshop recognized the need to initiate courses to orient medical officers to recent trends in organization, administration, and management techniques. Staff colleges were to be started to prepare senior health officials to play their role meaningfully as leaders in health administration. The workshop suggested that a diploma course in community health be started for district, State and Central health administrators and teachers of P.S.M. to provide knowledge on community health, impart skills in community diagnosis, and training in administrative techniques. The workshop recommended that an M.D. programme in community health must be started emphasizing public administration, health economics, programme administration and planning, hospital administration, medical care administration, and research methodology. The initiation of the M.D. (Community Health) course, and Staff College course at the N.I.H.A.E. since 1969 is a distinct outcome of this recommendation.

The Central Council of Health in 1968 directed that a committee be appointed :

- (i) To study all aspects of medical education and training of medical graduates in the light of national needs and resources;
- (ii) To consider the development of the medical curriculum in relation to national requirements, the need for uniformity of syllabus, apportioning of time between didactic

and practical teaching, selection of entrants to medical colleges, reciprocity between various medical institutions and universities and domiciliary restrictions in the matter of medical admission.

One of the major queries posed in the initial deliberations of the committee was, "Has the introduction of preventive and social medicine in the curriculum made any impact on the medical graduate, changed his outlook, and helped to produce a basic doctor?" This calls for a downright evaluation of the effectiveness of P.S.M. courses in producing a factor needed by the country. The committee also examined in detail the relationship of medical colleges to universities and the location of pre-medical education in a medical college *vis-a-vis* a science college.

Some of the important recommendations of this committee are :

- (a) the pre-medical course should comprise a study of language, physics, chemistry, biology, basic mathematics in relation to physics and social sciences.
- (b) The medical teaching and training should be oriented to produce a doctor conversant with the basic health problems of rural and urban communities and who was able to play an effective role in the provision of preventive and curative health services.
- (c) The teaching of preventive and social medicine should form an integral part of medical studies for the M.B.B.S. course and marks obtained in this discipline should be ranked along with other disciplines for the M.B.B.S. degree.
- (d) The teachers of preventive and social medicine should preferably have clinical experiences.

In their detailed recommendations regarding curriculum and teaching of P.S.M., the committee stated that:

- (a) Social sciences should be included in the pre-medical curriculum to serve as a background for the teaching of P.S.M.
- (b) About 60 hours must be devoted to the teaching of preventive and social medicine in the pre-medical curriculum. This should include bio-statistics, ecology of disease,

- demography, growth and development, nutrition, medical economics, sociology, and medical ethics.
- (c) Examinations should be conducted in preventive and social medicine, just as in any other subject during the pre-clinical period.
 - (d) Semester type of examinations must be organized at intervals of 18 months. Objective type or multiple choice questions should be used in these examinations.
 - (e) Preventive and social medicine should be taught for about 160 hours in the para-clinical period covering subjects such as environmental sanitation, elementary social sciences, nutrition, health education, medical entomology, industrial medicine, and epidemiology.
 - (f) During the clinical period, public health administration, maternal and child health, school health services, primary health centre, social security, family planning, vital statistics, rehabilitation, and social medicine should be taught.

The Delhi branch of the Indian Association for the Advancement of Medical Education in collaboration with the U.G.C. organized an institute for teaching of social sciences in medical colleges in October 1969 at Delhi. Some of the recommendations of the institute are :

1. Teaching social science in medical colleges should be integrated with medical subjects. This would require careful prior preparation on the part of teachers.
2. Social science courses should include contents drawn from various disciplines so as to provide medical students with additional information, skills, and attitudes towards making an effective doctor.
3. All clinical departments must adopt a clinical, psycho-social case study approach.
4. Efforts should be made to develop and promote cooperative relationships between doctors and social scientists and that social scientists should be included in the medical college team at an appropriate level.
5. Additional measures have to be undertaken to strengthen the teaching-learning situation including development of work manuals, preparation of books of readings and case

histories for ready reference in integrated teaching.

6. Some of the core social science concepts may, however, be given in the pre-clinical years through formal lectures, discussions, and seminars.
7. Manuals for teaching, a bibliography of related literature, short films, and programmed instruction materials may be undertaken immediately.
8. Interdisciplinary research with a community focus should be undertaken in medical colleges and university departments of social sciences. Findings of such results may be introduced in the integrated teaching programme.

Three other sub-groups of the institute examined and made specific recommendation on the logistics of teaching and research in this area. These will be discussed in detail in the appropriate sections.

Another important event is the appointment of a Study Team by the I.C.S.S.R. to examine the scope and status of social sciences in professional education – medical, engineering, and agriculture.

Existing social science capabilities to meet this demand

According to an estimate made in 1972 there are over 630 social science departments in the Indian universities in addition to over 100 research institutions. In addition to 2,180 social scientists working in the universities, there would be a substantial number (around 7,000) in the affiliated colleges. In the 399 technical institutions there are 772 social scientists, of whom 281 are in medical colleges. Excluding the student population there are about 10 to 12 thousand social scientists in teaching and research institutions. Over the years social scientists have increasingly moved into applied fields. This is an encouraging trend, as the social scientists have moved into the portals of other disciplines and have to contribute meaningfully to applied problems. This is a challenge social scientists have to meet with courage and fortitude. They have been doing so.

According to an I.C.S.S.R. report (1973) there were 2,180

social scientists working in universities. As mentioned earlier, of the 772 social scientists working in technical institutions, 281 were working in medical colleges. The I.C.S.S.R. sent out questionnaires to them. Of those who were sent questionnaires, 122 replied. The recency of this trend is indicated in the age distribution of these scientists as indicated in Tables 1 and 2.

Table 1. Social scientists in medical institutions

Age group	Social scientists in medical institutions	
	N	%
Below 25	4	3.28
26-35	54	44.26
36-45	39	31.97
46-55	19	15.57
55 and above	5	4.10
Not mentioned	1	0.82

Table 2. Discipline-wise break-down of social scientists teaching in medical institutions

Specialization	Percentage in medical institutions (N=122)
1. Sociology and anthropology	6.56
2. Psychology	12.30
3. Social work	8.20
4. Agricultural extension	—
5. Commerce	0.82
6. Economics	1.64
7. Education	0.82
8. Agriculture	—
9. Veterinary	—
10. Preventive & social medicine	51.64
11. Political science	0.82
12. Nursing	4.10
13. Psychiatry	2.46
14. Philosophy	—
15. Not mentioned	0.82
16. Others	9.84
Total	100.00

The question "who is to teach?" needs to be reviewed very objectively apart from parochialism and professional fanaticisms of varying kinds and degrees. Obviously the state of affairs at present is unsatisfactory. As pointed out earlier, medical men have been teaching the social science contents in the P.S.M. department. Table 2 indicates that over half of the specialists who teach social science in medical colleges are in the P.S.M. department. No one has indeed evaluated their work in any systematic way. The failure to involve social scientists in the teaching of undergraduate and post-graduate levels has been reflected in many ways. One of the obvious reflections is the product of such lopsided education – the doctor who has to go a long way in adjusting himself to social realities. The prevalent widespread discontent about P.S.M. departments, their role and achievements is another such visible effect. As the P.S.M. departments have taken the responsibility of teaching social sciences, any evaluation of social science teaching has to be done within the framework of the P.S.M. departments' functioning. Of course, one is acutely aware of the gross error of treating P.S.M. departments as synonymous with social science departments. Several forums have critically reviewed the functioning of P.S.M. departments. The Health Survey and Planning Committee (1961) said, "...training in public health in rural areas in collaboration with the department of preventive and social medicine has not been quite a success." Several other forums have expressed their dissatisfaction with the P.S.M. departments. Lack of collaboration in teaching between P.S.M. and other clinical departments has been highlighted by several experts. At least part of the dissatisfaction with P.S.M. departments may be attributed to the nonfulfilment of expectations regarding the teaching of social science components by them. Some of the adverse reactions received by P.S.M. faculty from other medical professionals is very disheartening. The fact that P.S.M. departments have been relegated to secondary importance in most medical colleges in India and abroad has been well documented. Commenting on this reaction in the U.S.A., Lewis states: "For many years departments variously entitled Preventive Medicine, Public Health, Community Medicine and Community Health, etc. have labored as second class citizens in academic society. We suggest that these departments

had more of the characteristics of a minority group than a speciality. They frequently occupy hand-me-down quarters and teach in left-over time in the curriculum. Their encounter with medical students, who until quite recently demonstrated little interest in the disadvantaged, generated a variety of responses ranging from rejection to ridicule and apathy." Curiously enough, however, very creative teaching units and learning experiences for providing social science orientation to medical students have been suggested by some eminent P.S.M. professors. This can be illustrated by the plea for promoting family health care in the treatise on the "relevance of social and preventive medicine in family health" (B.G. Prasad, 1971).

A similar trend was indicated by Marwah in his suggestion for introducing longitudinal family studies by clinical students. Despite such efforts and enthusiasm in a few medical teachers, the teaching of social sciences have by far remained unsatisfactory in medical institutions. This obviously poses the question as to who should teach social sciences to medical students? On this issue there seems to be no unanimity across all levels of medical education. Two trends appear to be dominant. Some experts favour the idea of a social scientist with a clinical orientation to teach social sciences in undergraduate courses. The institute for teaching of social sciences in medical colleges held in New Delhi (1969) considered this suggestion favourably. The recommendations of the 1971 Medical Conference supported the same view.

A second view favours medical personnel with some training in social sciences to teach social sciences to medical students. The institute mentioned above, recognizing the non-availability of health-oriented social scientists in sufficient numbers, recommended that "social sciences must be taught by medical persons with appropriate social science orientation. Such medical teachers should have a minimum of three months' block orientation in an appropriate institution". Another argument in favour of this view is that the specialist often tends to over-teach his own subject, which is not desirable at the undergraduate level.

A query is often posed as to what will be the reaction of social scientists to teaching in medical colleges *vis-a-vis* teaching in a liberal arts college? It is often argued that due to the rigid

academic achievement requirements for admission in medical colleges, most people who enter medical colleges are young, intelligent, and talented and hence it is a pleasure and privilege for social scientists to teach such students, than it is to teach the average post-graduate students studying social sciences in the universities. The opportunities for intellectual interaction with non-social scientists in medical colleges and the enrichment value of such interaction is cited as an additional advantage to a social scientist working in medical institutions. At a conference in 1960 the position of the social scientist as a medical educator was summarized as follows: "He is placed in a highly unstable but exciting position as an innovator. He is privileged in comparison with colleagues in the liberal arts college to have less burdensome teaching duties, more financial support and encouragement for research. He is burdened on the other hand with a measure of isolation and loneliness that seems to be a part of ploughing new fields." While this may be true of the West, one is not sure whether financial support for research is really available to the social scientist placed in a medical college in India.

In several forums the disadvantaged position of social scientists in technical institutions where they are in the midst of non-social scientists has been highlighted. The recognized disadvantages are (i) the separation of the social scientist from the main stream of social science teaching and research which results in a feeling of inferiority, (ii) the second class citizen status in an alien atmosphere, (iii) discrimination against social scientists in terms of research and teaching facilities, promotion to higher positions, etc., (iv) lack of academic freedom, (v) relegation to the status of service departments. The above disadvantages and advantages are the two sides of a coin, both equally real. But their relative proportion varies considerably depending upon the equality of social scientists that are recruited to medical institutions. A competent, motivated, research-oriented social scientist can create a new image of the social sciences. A mediocre one, who looks upon the appointment in a medical college as a "stop-gap arrangement", being less competent, and poorly motivated can perform essentially service functions and fails to develop a separate, worthwhile identity

for social sciences. In short, he lacks all qualities of a good salesman.

This discussion appears somewhat artificial in the historical context of medical colleges having few or no social scientists on their teaching staff. In a recent survey conducted by the I.C.S.S.R., among leaders of the responding teaching institutions in agriculture, engineering, and medicine, 42 per cent of the responding medical institutions reported inadequacy of social science faculty, primarily due to non-existence of posts. The heads of medical institutions rated the performance of social scientists in teaching, in terms of qualifications and contribution to other extra-curricular work, as on a par with that of other medical teachers.

Availability of social science teaching material and researches to strengthen the social science component in medical education

Researches on Social Science aspects of Medical Education :

It is now clearly accepted by most professions that while the broad theories and principles of science remain universal, their application varies from country to country in terms of socio-cultural and economic factors, local conditions, and recipients' needs. This understanding necessitates the building up of local researches and indigenous experience in the form of case studies and other teaching materials to take care of the applied aspects of technical education. This local adoption is all the more necessary in medical education as it is a direct service to the community and must be flexible enough to cater to the changing community patterns and needs in a varying culture.

To approximately assess the available research with a bearing on social science components of medical education the author reviewed three Indian journals and one foreign journal as to the type of articles published and their relevance for teaching social sciences. Tables 3-6 reveal the analysis. It must, however, be added that the classificatory scheme used here is purely *ad hoc* and practical, and has no specific criteria behind it.

The *Journal of Medical Education* (India), in the period 1962 to 1973 had a total of 119 articles and papers of some relevance to social science teaching. Of these, 12 related to attitude, role, and adjustment of students and teachers, 32 related to curriculum

Table 3. *Journal of Medical Education*

Year	Education and training (students and teachers)			Psychological, social, and cultural aspects of health and disease			Health status studies (mortality, morbidity surveys)	Growth health studies services	Total
	Attitude role and adjustment	Curriculum and evaluation	Teaching methods, field practice	General (interaction of social factors in medical education)	Reaction to health programmes (attitude, belief, etc.)	Health education programme			
1962		1	2	2			1		6
1963		5	1	1					7
1964	1		1	1			1		4
1965	2	2	1	2					7
1966	1	5	4	4			6		20
1967		2		8			1		11
1968	2	2	3	8					15
1969	3	8	3	6					20
1970	1	2		2	1			1	7
1971	1	2	2	1			4		10
1972	1	2	1	3	1				8
1973		1		2					3
Total	12	32	18	40	2		13	1	118

Table 5. *Indian Journal of Public Health: Analysis of social science-related articles*

Year	Education and training (students and teachers)		Psychological, social and cultural aspects of health and disease		Health status studies (mortality, morbidity surveys)	Growth studies	Health services	Total
	Attitude, role, and adjustment	Curriculum and evaluation	Teaching methods, field practice	General Reactions to health programmes (including attitudes, beliefs, etc.)	Health education	Impact of health programmes	Applicability of social science concepts to clinical practice, research, and teaching	
1965*				1	1	2	1	7
1966				1	4	2		8
1967	1	1		1	2	5	1	11
1968	1			1		5	1	9
1969		1	1	1	1	4	3	11
1970		1		1	1	3	2	8
1971				1	1	2	3	7
1972	1					2	1	4
1973						2		3
Total	3	1	2	1	6	8	4	26
						5	2	10
								68

*No articles on social science aspects were found in issues of 1960-1964.

and evaluation, 18 to teaching methods (including field practice), and 40 were general articles indicating interaction of social factors in medical education. In the broad category of psychological, social, and cultural aspects of health and disease 3 articles pertained to an important area such as reaction to health programmes in terms of attitudes, beliefs, etc., and 13 articles on application of social science concepts to clinical practice, research, or teaching. Not a single paper dealt with either health education or the impact of health programmes on people. One article pertained to health services.

In contrast, the *Journal of Medical Education* (U.S.A.) analysed for the period 1960 to 1972, revealed a total of 235 articles which had to be analysed on different classification categories as their coverage was very different. Fiftythree articles pertained to attitudes, perceptions, role expectations, and adjustments of medical teachers and students, 20 to curriculum and evaluation, 40 articles on student selection procedures, student achievement and its correlates, 41 on teaching methods, field practice, and research, and 60 articles on general interaction of social science concepts with medical education. About 16 articles pertain to administration of medical education and 3 to career aspects. It will thus be seen that more concern seems to have been articulated in the West regarding continuous improvement of medical education.

As a corollary, social science-related articles appearing in the *Indian Journal of Public Health* (1965 to 1973) and the *Indian Journal of Social and Preventive Medicine* (1969 to 1973) were analysed. The analysis reveals that in the *Indian Journal of Public Health* a total of 68 articles relevant to social sciences appeared, out of which only 17 related to various aspects of training and education of medical teachers and students, such as attitude, role and adjustment, curriculum and evaluation (1), teaching methods and field practice (2), and general (1).

In the broad category of psychological, social, and cultural aspects of health and disease, a total of 44 articles appeared, of which 26 pertained to application of social science concepts to clinical practice, research, or teaching, 8 to health education, 6 on reactions to health programmes, and 4 on the impact of health programmes. Of the rest, 10 papers related to health services, 2 were growth studies, and 5 health status studies.

This trend is encouraging because the maximum number of articles are concerned with application of social science concepts to clinical practice, research and teaching.

Articles appearing in the *Indian Journal of Preventive and Social Medicine* were analysed between 1969 and 1973. A total of 44 articles were found during this period covering social science and other aspects relevant to medical education. Of these, 3 pertained to attitudes, perceptions, expectations, and adjustments of teachers and students, 3 pertained to curricula, 6 to teaching methods/field practice, and 10 to interactions of social science concepts with clinical practice, teaching, and research. No less than 18 articles were devoted to the application of social science concepts to health and disease.

The conclusion emerging from this review seems to be that while quite a good number of studies are reported, there is no balanced development of researches to answer the needs of medical education at all levels. Research on medical education is inadequate in both quality and quantity. "Health-related material pertinent to Indian socio-cultural conditions is not available to the extent needed for teaching medical and other students and for planning programmes." There is a great difference in orientation between behavioural scientists and health administrators and between physicians and social scientists. Physicians by virtue of their training and professional demands are action-oriented to diagnose and treat communities. Social scientists bring basic academic orientation to the study of problems, their main interest being in contributing to knowledge and building of theory. Somewhere these two objectives have to meet.

It is also true that studies done by M.D. students and medical professors can serve as useful material for teaching purposes. There has hardly been any attempt to use the material reported in the content analysis of journals or other unpublished work for teaching. This area deserves further exploration.

Reaction of medical faculty, students and other social scientists to social sciences teaching

Resistance to the inclusion of social sciences in medical education despite the recognition of its importance long back

[Paracalsus (1490–1511) and Sydeiham (1624–1686) had recognized the significance of knowing a patient as a human being in the context of his physical and social background] seems to be caused by a number of factors:

1. Rapid advances in research in natural sciences which have resulted in fast accumulation of knowledge so that the medical curriculum, already overcrowded, becomes too heavy, and social sciences are considered as an additional burden with very little utility.

2. Both teachers and medical students fail to see the direct relevance and importance of behavioural and social science knowledge to a meaningful performance of their tasks as doctors.

3. Lack of really dedicated, well-trained teachers in medical colleges to teach social science subjects. To the best of this author's knowledge, not even in one medical college in India does a social scientist teach or participate indirectly in the teaching of social sciences. The faculty of preventive and social medicine departments cannot teach social science in the same way as a social scientist does.

4. Lack of "holistic" view of patient care. The patient in his natural physical and socio-cultural environment is not fully understood. A specialist, highly fragmented approach is adopted in diagnosing, curing, and rehabilitating the patient.

5. Relatively slow emergence of the wider concept of health care to include preventive, promotive, and rehabilitative aspects in addition to the overemphasized curative services. Over-emphasis on cure shifts the major responsibility of health care to the doctor while the very concept of prevention implies (i) an interaction between the physician and people/communities, (ii) better appreciation of the relevance of socio-cultural and environmental factors in the causation of disease, (iii) action to be taken by the people themselves, (iv) recognition of the legitimacy of people's demands and expectations in the promotion of health and delivery of health services.

6. Lack of appreciation of the complexities and implications of psychosomatic interactions and proper appraisal of the role of psychological, social, and cultural factors in the causation and cure of diseases.

7. Apathy about the teaching of social sciences.

8. The notion that social and preventive medicine is not as academically challenging as other medical specialities.

9. Inadequate teacher motivation.

10. A self-selection process by which the brighter medical men branch off to other specialities leaving more than a normal share of mediocrity to the P.S.M. departments.

11. A sense of inadequacy in the older generation of medical teachers who had no social sciences when they were trained, and take a defensive position that all is well with their own training.

In a study sponsored by the N.I.H.A.E., P. Ramalingaswami *et al.* (1971) attempted to assess the comparative preferences of undergraduate medical students to various medical specializations and the reasons that influence the students in choosing a particular speciality. They studied 135 undergraduate students in a medical college in New Delhi. One of the main findings of this study is that out of 18 specialities ranked, preventive and social medicine received the seventeenth place. The study involved comparison of three sub-groups of 45 students, each in different stages of medical education: those who had just completed their internship (group A), those who had just entered the internship period (group B), and those that were in the last year of their study (group C). It is interesting to note that for the three groups of students the preference for specialities did not change significantly with their progression through the clinical phases of their training.

In their later study (1972) P. Ramalingaswami *et al.* aimed at assessing the perception of medical students about the specialities of preventive and social medicine, and to make a comparative study of the students' perceptions of preventive and social medicine in relation to public health and community health. The sample consisted of three groups of students totalling 228, who had passed their university examination in preventive and social medicine. One group was drawn from a co-educational national medical centre, another from a women's medical college, and the third from a co-educational medical college in South India. All the three institutions had strong P.S.M. departments and had post-graduate teaching in this discipline. Preventive and social medicine was regarded by the students as "routine" and "retrograde" while community health was

considered "challenging" and "progressive". P.S.M. was rated as theoretical while public health was considered "practical". The general trend was to rate community health better than public health and public health better than preventive and social medicine. The students were aware of the importance of these specialities to society. But they feel that P.S.M. has no utility value. This is probably a reflection of P.S.M. as it is taught at present to the undergraduates.

In a recent study, Chattopadhyay attempted to find out (i) the understanding of the term "social sciences" by students, interns, and teachers, (ii) relevance of social sciences as perceived by them, (iii) their attitude towards social sciences, and (iv) their views regarding the organizational environment of a medical college as a place of work for a social scientist. A sample of 1,509 consisting of 1,124 students, 176 interns, and 209 teachers was drawn from 11 out of 96 medical colleges. An analysis of the data revealed that students, interns, and teachers alike had difficulty in expressing clearly what they understood by the term "social sciences". Responses ranged anywhere between vague descriptions of social sciences "as a science of society of human beings", etc. to mention of specific social science disciplines such as sociology and psychology. About 39 per cent student respondents did not reply to the question regarding the relevance of social science knowledge to the medical profession. The views of all the three groups were not clear on this issue. On a Likert type attitude scale to indicate their attitude towards social sciences, about 77 per cent students expressed positive attitudes, compared to 45 per cent of other teachers, 48 per cent interns, and 61 per cent of P.S.M. teachers. Students and interns perceived social sciences as somewhat *nice, good, useful, practical, logical, and meaningful*, while teachers perceived social sciences as *quite nice, good, useful, logical and somewhat flexible, practical, liberal, deep, concrete, systematic, factorial, realistic, creative, relevant, interesting, sophisticated, and solid*. All groups perceived social sciences as descriptive. All groups were less favourably inclined towards social scientists working in medical colleges. In their curricular preference, from out of 18 specialities students gave fifteenth rank to P.S.M. while interns gave it the seventh rank. Regarding the organizational climate, 61 per cent of P.S.M. teachers considered that the atmosphere of the medical colleges

did not generate estrangement from the mainstream of the social scientists' profession, while 67 per cent also stated that the scope for exercising influence by a social scientist in a medical college was poor. Seventy per cent students, 64 per cent interns, 73 per cent of other teachers, and 66 per cent of P.S.M. teachers considered social scientists as peripheral members in a medical college. However, 87 per cent P.S.M. teachers considered that social scientists should have central positions.

In an I.C.S.S.R. survey reported earlier in this paper, Atal reported that 46.15 per cent teachers and students had a mental attitude towards social sciences, as described by heads of medical institutions. Fifty per cent of the heads felt that social scientists had no problems in medical colleges, while the major problems identified were lack of a post-graduate programme, barriers to communication with social scientists in universities, and lack of library facilities. About 36 per cent heads of medical institutions felt that social scientists did not have much scope for career advancement in medical colleges. A large percentage (15.38) of heads of medical institutions thought that social scientists working with them were dissatisfied as compared to heads of agricultural and engineering institutions. Fifty-four per cent heads of medical institutions felt that the usefulness of social sciences was yet to be demonstrated.

The reason for this state of affairs is not hard to find. In a recent survey Atal (1975), reporting on the academic status of social scientists in medical colleges, found that 26 per cent were of the rank of professor or associate professor, while 19.67 per cent were lecturers and 23.77 per cent were of the rank of tutor/instructor/social worker. Forty per cent considered the liberal education function as the aim of teaching social sciences in medical education while 84.42 per cent identified the aim as the professional training function of social science teachers in medical colleges. While 47.54 per cent felt that the attitude of other colleagues was neutral, 32 per cent considered it as hospitable. Thirteen per cent complained that the attitude of administrators was hostile to them. The majority of the social science teachers in medical institutions operated in an indifferent milieu. As compared to social science teachers in universities, 26 per cent felt that they were wrongly placed, 47 per cent found no difference, and 19 per cent reported themselves as better placed. Twentysix

per cent of social scientists felt themselves to be lower in status compared to their colleagues in other departments in medical colleges. The research output of the sample social science teachers was low: 57 per cent had written no research paper at the time of the survey. Acceptance and contentment index were low.

Existing social science curriculum in medical colleges

In the context of the review of the present status of social science teaching in medical education, a review of what is being taught at present is a logical forerunner of any possible recommendations regarding syllabi or curricula. This can be reviewed with a proper appraisal of the objectives of teaching social sciences to medical students.

Reviewing the role of behavioural sciences in medical education, King (1969) has suggested two different approaches "each with its own distinct frame of reference and its own image of the physicians' function in the social order". The first approach, essentially traditional, has the image of the physician as that of a qualified medical practitioner whose major function is the maintenance and improvement of personal and public health. Within this frame of reference behavioural sciences have a great deal to contribute to the qualitative improvement of medical education. Of the several improvements in theoretical and empirical aspects of psychology, sociology, cultural anthropology, and other behavioural sciences, knowledge important for "understanding psychological dimensions of the doctor-patient relationship, of fundamental sociological concepts essential to socio-medical issues, of the social and cultural determinants of health, of group behaviour or of those aspects of organization theory essential for the understanding of a hospital's function", have been specifically mentioned.

The second approach suggested by King has a broader frame of reference of "education and development" or "international development education" defined as "the field concerned with organized programmes of teaching and learning within the context of planning for economic, social or political change in newly developing regions of the world". This framework would include, in addition to immediate problems of health and disease,

problems peculiar to developing countries such as problems of economic development, social and national integration, community development, educational modernization, nation-building and of social development in its wider sense. Within this broader framework, a different image of the physician is envisaged, an image which recognizes that the doctor's responsibilities extend beyond the confines of the surgery or the clinic. It is an image which assumes that the doctor in a developing society has many more roles to perform than has his counterpart in the industrially advanced nations of the West, an image which envisages the doctor as one of a small minority of a university-educated professional class whose responsibilities as members of "modernizing elite" far exceed the highly specialized system of training which has till now been provided for them.

One of the problems in medical education at present is the lack of clear-cut objectives for teaching of social sciences. In a comparative appraisal of preventive and social medicine in the U.S.A. and in India, Rice (1966) mentions, "At present there is little consensus on what subjects should be included and how they should be taught. Each medical school has its own objective as to what type of physician should be produced. The objectives, curriculum and student preparation must aim at common goals."

Following the recommendation of the first conference on Medical Education, sponsored by the Government of India in 1955, separate departments of preventive and social medicine were established in medical colleges in India. Consequent upon this, a number of attempts have been made to develop a suitable curriculum for teaching preventive and social medicine. (Jungalwalla 1962; B.G. Prasad, 1966; Haynes, *et al.*, 1966; Udain 1966; V.C. Jain, 1967; K.N. Rao, 1967; Dutta, *et al.*, 1968; B.G. Prasad, 1972).

As a part of its survey of the status of social science teaching in medical education in India, I.C.S.S.R. requested each medical college to send its social science syllabus. Gupta, who undertook an analysis of the responses by different medical colleges, reports that about 83 per cent of the colleges did not send their syllabi and 26 medical colleges responded favourably. This covered 14 States and one Union Territory. All but one of the responding colleges are affiliated to universities. The diversity

and incompleteness of the information received from the 26 colleges is very well highlighted by Gupta. Out of the 26, three did not send their detailed syllabi, five sent detailed syllabi, seven sent a copy of the syllabus of social and preventive medicine paper, and the rest sent only part of a paper. Three out of the last 11 did not specify whether the topics of social sciences taught to medical graduates were part of preventive and social medicine or taught under a separate paper. Further, the data available was not comparable in terms of number of teaching hours devoted to social sciences. The diversity in the syllabi of different colleges and between colleges affiliated to the same university was somewhat appalling. Other details such as suggested readings and marks allotted to the social sciences paper were not given by the responding colleges. Six colleges out of the 23 introduce their students to the field of social sciences in general. Two colleges explain the meaning of social sciences to their students and also the difference between social and behavioural sciences. Relationship of social sciences to medicine is taught at 4 places. Out of the 23, only 10 colleges teach some sociology. The topics generally covered are society, community, groups, institutions, social change, social stratification, status and role, social structure, socialization, religion and magic, culture, social control, organization, social system, family, marriage, kinship, social problems, rural sociology, medical sociology. Even in the teaching of these subjects there is no uniform pattern in terms of content, hours of teaching, and coverage. Each college follows its own pattern. Only three colleges have included medical anthropology in their syllabus, and even here there is no uniformity. Demography and family planning are taught in five medical colleges, of which four have not given details. Twelve colleges are offering courses in psychology. The topics covered include, normal psychology, social psychology, abnormal psychology, developmental psychology, learning, personality, development of organism, adolescence, emotions, motivation, memory, intelligence, groups, perceptions, conditioning, etc. It is observed that all these subjects are not covered by all the 12 colleges.

Based on this survey, Gupta summarizes that though most of the colleges covered in the study exposed students to the basic concepts in sociology, the applied aspects of sociology in medicine

are not taught anywhere. Of the three colleges that provide some exposure to anthropology, none gives its application to medicine.

Thus, it appears that in addition to the lack of a uniform syllabus, there seems to be no concern for imparting a core social science content and its application to medicine in most of the medical colleges.

A few observations emerging from the foregoing review, meant to assess the present status of social science teaching and research in medical education, are offered here as a preamble to suggestions for improvement.

1. There is a need to streamline the professional education objectives of medical education.

2. The general education need and objectives for medical education need to be clearly spelled out. This should include some thoughts on preparation of physicians to fulfil non-technical roles.

3. The utter lack of rationale, uniformity, and consistency in the social science presently taught in medical education is somewhat shocking. There is diversity of content, and lack of innovativeness in teaching techniques as well as in relating course content to field teaching.

4. The quality in social sciences teaching is well reflected in the uniformly low rating done by students as well as other medical teachers of the social science teaching.

5. Although there is an encouraging trend in terms of increased research in applied aspects of medicine, there is no serious attempt to feed back the research findings to improve the total quality, content, and learning experiences in medical training. The actual number of reported studies on education and training aspects of students as well as teachers is rather poor.

6. Competent social scientists have not been hitherto seriously involved in teaching social sciences in medical colleges. This is reflected in the junior positions occupied by them.

7. Despite the dismal state of affairs, the fact remains that meaningful courses on social sciences need to be taught to medical students as they practise their technical skill in a socio-cultural milieu which they must fully understand. Hence the need for social sciences in medical training at all levels is undisputed.

Suggestions

Objectives

The objectives of medical education ought to be delineated for the three major areas outlined earlier: (a) the professional preparation of a physician to perform the physician's functions; (b) international development education covering the general education needs of physicians; and (c) preparation of physicians for performing non-professional roles.

The objectives must emphasize the need for a flexible curriculum to keep pace with other tenets of social change. From a clear-cut delineation of the objectives, the specific objectives of teaching social sciences must be spelled out. These must be related to the changing roles and community expectations of a doctor.

Curricula and course contents

The overall approach could be to offer the medical degree course consisting of three elements – a set of compulsory subjects, a group of limited alternatives, and a group of options which provides sufficient scope for the student to exercise his choice.

The undergraduate clinical years may be perceived essentially as a part of a basic university education in medicine. The aims of clinical stage of the undergraduate course, as outlined by the Royal Commission on Medical Education (1965–68) appears rational. It reads,

“To demonstrate the application of medical and behavioural sciences to the practice of medicine, thus giving the student an appreciation of the biological, environmental, and personal factors which underlie structural disease and disturbances of function;

To encourage a holistic attitude towards patients and avoid the increasing danger of considering them as cases, rather than as persons;”

Similarly, the objectives and curricula must be carefully worked out for pre-clinical, clinical, and para-clinical stages in medical education.

At present, the following approaches are prevalent regarding the social science curriculum in medical education. One is a discipline/speciality-based approach in which the actual topics to be covered in psychology, sociology, cultural anthropology, statistics, etc., are specified. For instance, in one of his papers Banerjee has specified the subject areas to be covered in the disciplines – sociology, social psychology, and cultural anthropology such as social structure, and stratification, urbanization, social change, community motivation, learning, etc. In the curriculum analysis reported by Gupta, cited earlier, of the existing social science curriculum in the 26 medical colleges, the approach is discipline-based. This seems to reflect the present trend.

The second approach seeks to merge a broad-based social science perspective in the existing medical subject areas. For instance, in a recent paper Marwah stated, "In short medical and social sciences of tomorrow must aim to integrate human biology and sociology". He further argues that social and behavioural sciences should permeate meaningfully and effectively throughout the five and a half years period of undergraduate medical education and give details on what should be taught in the pre-professional, pre-clinical, clinical, and internship periods. In the pre-professional period he identifies the role of social scientists as one of inculcating socially oriented attitudes. In pre-clinical years the social scientists and anatomists are to work together in emphasizing the role of anatomical parts in Man's material and immaterial culture and in coordinated physical anthropological research. In the clinical period social scientists are to work closely with medical students in developing comprehensive approaches to social aetiologies in addition to microbial approaches, social pathology in addition to clinical and laboratory pathology.

The third approach to social science teaching cuts across disciplines to problem areas where social science concepts can be meaningfully integrated into medical training. Madan has outlined a perspective which emphasizes the importance of a shift from disconnected episodes of illness to general health care, from the individual to his socio-cultural and economic setting. This approach would emphasize cultural definitions of illness or health rather than definitions in purely physiological or pathological terms. Implications of treatment also have to be viewed in the

context of cultural values. Another vital problem area is the exclusive recruitment to medical training of the elite, upper classes residing in urban areas which results in the alienation of the profession from society at large. A basic doctor who seems to be the desired product of medical education will be effective to the extent he can understand his society in a meaningful way. Ultimately, the three problem areas identified by him are (i) the role of culture in health, disease and treatment, (ii) the sociology of the medical profession, and (iii) the study of health care institutions from the viewpoint of maximizing their efficiency.

In the department of behavioural science at the University of Kentucky the two major objectives of medical education are (i) to provide future physicians and other health personnel with a conceptual perspective in terms of which to understand the impact of society and culture on disease and its management, and (ii) to illustrate the application of this perspective to specific health problems and the life experiences of patients as well as to the organization of medical services and the experiences of health personnel themselves. To achieve these goals the following concepts are recommended: (i) The concept of health and medicine as a behaviour system stressing the interrelationship of the five behaviour systems – the internal body system, the environmental system, personality, social system, and cultural system. (ii) A historical and cross-cultural perspective enabling the student to relate developments in the organization of medical care to other areas such as government, religion, arts, etc. (iii) The conception of alternative responses to illness. (iv) Application of behavioural science concepts for understanding such major life experiences such as pregnancy, infancy, childbirth and death.

It appears that a problem-oriented rather than discipline-oriented approach to teaching of social sciences is more adequate to provide an effective experience to doctors to relate their knowledge of the biological process to relevant social, cultural, and personality factors.

Methods of teaching

Views on how to teach social sciences to medical students are

many and varied. One of the approaches is based on the philosophy of "learning by doing" exemplified in the family health advisor service of the University of Pennsylvania in which the student is placed as a "health advisor" to some families early in his medical school experience, with limited responsibility and careful and close faculty guidance. Among the faculty, a sociologist will be present who will follow up the home experience of the student with case demonstration in teaching conferences.

The more prevalent traditional approach is the didactic teaching, using lectures and seminars. Excessive reliance on didactic lectures and hospital ward rounds and the right lines of demarcation between specialities and failure to present health and disease of man as a whole has resulted in unnecessary fragmentation of knowledge and lack of perspective among medical students. Unified and integrated approaches to teaching, involving close working relationship between different specialists, are very helpful. It would also take care of inculcating in the young student the concept of team work. Collaborative methods of teaching such as clinicopathological conferences, seminars, group clinical teaching, syndicates, etc., should be increasingly used. This will bring in better inter-departmental coordination and help the student understand the importance of his becoming a doctor. One way of implementing this in order to have a dynamic rather than a deadlog curriculum is to formulate an inter-departmental committee to periodically review the curriculum and effect necessary changes in it. The system of "clinical clerkship" practised in London is worth testing. A small group of students is attached to a "firm" so that they learn by sharing in the day-to-day care of patients. This helps in the inculcation of proper attitudes. The Royal Commission suggested that the student allotted to an outpatient department through the hospital may follow up cases at home through attachment to general practitioners. They also suggested a period of residence in hospital during the undergraduate course.

Many of these suggestions may be examined in terms of their application to internship programmes prevalent in India. In this context, the field demonstration areas attached to P.S.M. departments in medical colleges also need careful review.

Who should teach social sciences ?

The overall discontent with the teaching of social sciences in medical colleges was also expressed by the Royal Commission on Medical Education. They attributed this to laboratory-oriented rather than real life-oriented approach to the teaching of psychology, absence of a body of teachers with full academic training in the behavioural sciences and a qualification in medicine, etc. Thus, by necessity medical schools have been tempted to fall back on clinical staff to teach social sciences. It is often observed that social scientists placed on the payroll of medical colleges feel cut off from the mainstream of social sciences and consequently experience a double devaluation—one in the medical college, being dubbed as “non-medical faculty”, and the other among their social science colleagues in universities for having barged into an applied field.

The recommended actions in this regard are:

1. Departments of medical psychology and medical sociology should be established within medical schools.

2. Teachers from the departments of P.S.M. should be encouraged to attend lectures in university departments of social sciences.

3. Social scientists should be frequently invited to deliver lectures in medical colleges.

4. A visiting or an exchange of faculty arrangement may be worked out between medical colleges and social science departments in universities whereby social scientists work for 2 to 3 years in medical colleges, create a culture of social sciences in the medical milieu, and go back to the mainstream of social sciences. Such an arrangement would be mutually enriching. As a corollary to this, joint research projects may be undertaken in which university social science teachers collaborate with departments of P.S.M.

5. Regular orientation courses, summer institutes, and workshops may be arranged for P.S.M. teachers to keep them abreast of the emerging trends in social science.

6. P.S.M. departments and social science departments may jointly sponsor research methodology courses to medical postgraduates.

Such increased opportunities for interaction will help the promotion of social sciences in medical education.

COMMENT ON WORKING PAPER III

T.N. Madan

Institute of Economic Growth, University of Delhi, Delhi

DR. KAMLA GOPAL RAO'S paper is a painstaking, detailed, and very useful review of various reports resulting from committees, conferences, and seminars on the subject of the place of social sciences in medical education. The principal conclusion which she arrives at is that "the greatest problem" in medical education at present is the lack of clear-cut objectives for teaching of social sciences to medical students. I do not think that this can ever be the "greatest" problem, for such a problem would inevitably have to deal with the core training of the medical student. However, it undoubtedly is a very complex problem. What ought to be emphasized, I think, is that the role of social sciences in medical education is variegated and somewhat complex to assess. There would be general agreement, however, that the principal aim should be to provide a perspective to the medical student which his orthodox medical education does not.

This perspective will have to emphasize the importance of a shift from disconnected episodes of illness to general health care, from the individual to his socio-cultural and economic setting. Illness or disturbances in the human system and health are culturally defined as much as they are defined in psychological and pathological terms. It is, therefore, of the greatest importance that the two types of definitions are taken into consideration. Similarly, the implications of a course of treatment would also have to be viewed in the context of cultural values.

Further, a social science component of medical education could help in increasing the medical student's awareness of the contemporary social and economic problems of our society. This might hopefully result in a greater awareness of social responsibility among the elite professional workers in our society. There can be no doubt that doctors occupy a central

position among such professionals. If the awareness of the surrounding society is increased, the medical student will hopefully learn to reorient himself towards it and away from Western countries and the conditions there.

There are many biases which doctors in our society suffer from as a result of their social background. The bulk of our medical students come from the middle and upper middle classes, and from urban areas. They go through elite educational institutions. Their career ambitions are conditioned by their reference groups. Consequently, they are alienated from the society at large. Social science education could go far in bringing this fact of alienation to the conscious level.

The above points should be related to Dr. Rao's repeated references to the need and importance of the "basic doctor", who is to be an adviser to people on all matters relating to health. She shows clearly how our discussion of this important subject has got bogged down in the relatively narrow problem of preventive and social medicine.

Dr. Rao has referred to the many social science disciplines that are to be taught. Drawing obviously from the facts presented in her table on the subject, she suggests that sociology, social anthropology, and social psychology are the principal relevant disciplines. It seems to me that we would have to speak in terms of problem areas rather than in terms of disciplines. When we focus on such areas our approach will be interdisciplinary. I would suggest that three areas stand out in importance. First, the role of culture in health, disease, and treatment. Second, the sociology of the medical profession. Third, the study of health care institutions from the point of view of maximizing their efficiency. There are other problems which also could be emphasized, most notably, perhaps, the phenomenon of the migration of doctors to countries in the West.

Regarding the location of teaching of social sciences to medical students, this of course would be in the medical colleges with the help of faculty employed by medical colleges. But such faculty will not become available unless university departments of social sciences provide teaching and research facilities in the area of socio-psychological dimensions of medicine. The need for a continuing dialogue between medical colleges and social science departments in universities is, therefore, very great.

The subject of social sciences in medical education has been discussed a great deal in recent years. It seems that the time has come to take it out of the committee and conference rooms and into the class-rooms and clinics. Meanwhile, the greatest need is for social scientists to realize the limitations of their disciplines in relation to medical education as much as they emphasize their scope.

COMMENT ON WORKING PAPER III

I. D. Bajaj

DR. KAMLA GOPAL RAO has reviewed the status of social sciences teaching in medical education. In her review she has extensively quoted from policy level committee reports of medical education seminars and conferences and from a selective appraisal of Indian and foreign journals primarily related to medical education. Since the Indian Council of Social Science Research has set up a Study Team on the status of social sciences in medical education, Dr. Rao could have also quoted the views of pure social scientists on this aspect, specifically indicating as to what these social scientists expect from a doctor and in their opinion what particular aspects of social sciences should be taught to the medical students.

In the framework of the review she has covered five dimensions. Another dimension which I feel could be added is the extent to which social sciences should be taught to medical students. This has not been decided so far and will need further investigation. Under the heading of "Philosophy and Objectives of Inclusion of Social Sciences in Medical Education", Dr. Rao has quoted views of prominent medical educationists emphasizing the importance of teaching social sciences to medical students. In her conclusion of this section, under item 3, she writes, "The general education components of medical education have not received any attention so far." I feel it should be clarified as to what exactly is meant by the "general education" components of medical education.

While reviewing the demand of social sciences in medical education, Prof. Rao has pointed out that professionals have been concerned for a very long time with the inclusion and continuous improvement of the social science component of medical education, with particular emphasis on social and behavioural sciences. Dr. Rao in her review has extensively quoted the views and recommendations of various committees and

conferences on the teaching of preventive and social medicine. In our over-enthusiasm, I feel, we have overdone the teaching of preventive and social medicine. It is being taught from the first year as soon as a medical student enters the medical college and continued throughout his stay in the college. This overdose has produced a certain retaliation on the part of the students and they are not very attentive in the classes. They feel the subject is going to be with them throughout their period of study in the medical college.

In our curriculum there has been aping of Western countries, particularly America, and we have not paid much heed to the existing conditions in our country. The Central Council of Health has rightly raised the question, "Has the introduction of preventive and social medicine in the curriculum made an impact on the medical graduates, changed his outlook and helped to produce basic doctors?" This calls for downright evaluation of the effectiveness of preventive and social medicine courses in producing a doctor needed by the country, as Dr. Rao says.

About the teaching of social sciences at various levels of medical education as reviewed by Prof. Rao, I feel that the teaching of social sciences calls for a review and we should ask the Medical Council to examine the whole question and lay down the curriculum for the teaching of social sciences in the preventive and social medicine departments. The preventive and social medicine departments in different medical colleges of various universities are not following a uniform curriculum. The Medical Council must lay down proper guidelines in this respect. The medical curriculum is already burdened with many subjects. We must be very clear as to what is the most essential component of social sciences which must be taught to every medical student. The I.C.S.S.R. and other prominent social scientists should also be consulted by the Medical Council before laying down the curriculum for the medical students, since, as has been pointed out in Prof. Rao's paper "Health", related material pertinent to Indian social-cultural conditions is not available to the extent needed for teaching medical students.

Under the heading of "Suggestions" she has mentioned one objective as "International development education covering the general education needs of physicians." (objective 'b'). I feel

this objective needs more elaboration and should be clearly defined. Similarly under "a" it is written "preparation of physician for performing non-professional roles". In my opinion such roles should be explained in detail so that this objective is properly understood.

Under the heading of "Curriculum and Course Contents", Prof. Rao has pointed out, "The overall approach could be to offer the medical degree course consisting of three elements – a set of compulsory subjects, a group of limited alternatives, and a group of options which provides sufficient scope for the medical students to exercise his choice." Prof. Rao is aware that in our country there is a set syllabus laid down for a medical student and he has to pass the examination in the subjects laid down before he is awarded the M.B.B.S. degree. Where then is the scope for alternatives and options? The curriculum for social sciences will have to be defined for the medical students, and once it is laid down, every medical student will have to take the basic minimum course in social sciences which has been laid down in this curriculum.

About the methods of teaching and who should teach social sciences, I generally agree with the views expressed by Prof. Rao.

REPORT OF THE WORKING GROUP ON SOCIAL SCIENCES IN MEDICAL EDUCATION

Dr. P.N. Wahi – Chairman*
Dr. Somnath Chattopadhyay – Rapporteur

DISCUSSION RECORD

THE GROUP worked on three specific areas outlined by Prof. M. S. Gore in his address at the inaugural session. These were :

- I. Objectives of teaching of social sciences.
- II. Content of social sciences.
- III. Strategy of providing the social science inputs.

The materials to start the deliberations were : (a) The inaugural address of Professor Gore, (b) The paper on the Role of Social Sciences in Medical Education by Prof. P. N. Wahi, (c) Three papers on social sciences in medical education by Dr. K.G. Rao, Dr. D. Banerjee, and Dr. Somnath Chattopadhyay. The group also used the report of Dr. S. K. Gupta and Dr. H. R. Chaturvedi. The key-note address was delivered by Dr. S. M. Marwah. A brief report of the deliberations is presented here.

I. Objectives

The objective of teaching of social sciences should be a part of the broad objectives of medical education. The objective

*I would like to express my personal thanks to Prof. P.N. Wahi for his able guidance to Prof. J.S. Neki, Prof. Madan and Prof. K.G. Rao for helping me prepare this report, and to all the others for their valuable contribution.

of providing social sciences in medical education, therefore, is to enrich the quality of medical education in general and to produce a good "basic doctor" who is aware of his social responsibility. The specific objective of social sciences in medicine is to shift the emphasis from the organismic, disease-oriented approach to a holistic, community health-oriented approach.

II. Content of social sciences in medical education

The content of the social science courses should be of three different types which are relevant to (a) students, (b) faculty, and (c) research. The three types should be interconnected in such a way that they provide continuous feed-back for research, for teaching of students, and for teacher education. The group thought that before the contents or the dimensions of the contents were worked out it was necessary to bring about a significant change at two levels: (a) change in the culture of social scientists, and (b) change in the culture of medical education. Before social scientists try to change the culture of medical education they have to understand and change their own professional culture so that they can render real and meaningful service to medical education. Social scientists must know the relevant concepts and have sound knowledge in the methodology applicable to medicine. Social scientists should understand the value system prevalent in medical education, find out its vulnerable points, evaluate the culture and then try to bring about the desired changes.

This is a prerequisite for any change in medical education. This process itself will bring out significant areas for curriculum planning. At the present stage, the four areas of social sciences which the group thought would be meaningful for medicine are:

1. *Cultural anthropology*

Questions to be dealt with are of the following types : (a) What are the types of morbidity and disturbances produced by the socio-cultural environment? (b) Do cultural beliefs define disease in ways that are in variance with the medical definition?

(c) Do cultural beliefs stand in the way of treatment or in providing community health?

2. *Sociology*

What is essentially required here is to teach the sociology of the profession and to create in the physician an awareness of his role. Studies on social factors such as his class background, career ambitions, socialization in medical colleges, his following of Western models, etc., were considered to be important. It is also necessary to define precisely what is meant by a "basic doctor". The alienation of the medical student from the society as well as from the academic community, the problem of brain-drain, the problem of absorption, the notion of professionalization, standards and ethics—all these need to be studied in the sociology of the medical profession.

3. *Psychology*

It was felt that emphasis should be given to the teaching of (a) opinions, beliefs, perceptions, attitudes, attitude-formation, and change of attitudes; (b) foundations of individual behaviour—cognition, affection, conation, rational and irrational behaviour, principles and dynamics of planned change, social change and individual behaviour; (c) social norms, reference groups, influence of groups on individual behaviour; (d) communication—its process and facilitators, problems in communication at the inter-personal level as well as at the doctor—community level; (e) emotion and perception base of health and disease; (f) learning and motivation in health and disease.

4. *Organizational behaviour*

The medical students should be taught the concept of system and the systemic approach for looking into problems of the family and community. Since most doctors are called upon to work in organizations, for example, primary health centres, they should be provided with the understanding of the dynamics of organizational behaviour. They should also have some ideas about the organizational studies in delivery of health care,

especially the economy of inputs and the efficiency of outputs.

III. Strategy of providing the social science inputs

The group thought the following strategies should be adopted:

1. Establishment of departments of social – behavioural sciences in medicine.

2. Identification of resource material for inputs in social sciences.

3. Health team orientation to permeate medical education.

4. Community health orientation, not confined to the P.S.M. department only, but permeating the entire faculty. For this, the faculty should be helped in their development by (a) regular orientation courses, (b) summer institutes, and (c) Workshops.

5. These orientation courses, etc., may be arranged for the medical faculty to acquaint them with emerging trends in medical sociology.

6. There should be exchange of faculty members between the P.S.M. department or any other department concerned with social sciences and the university departments of social sciences for (a) Extension lectures and (b) Collaborative research.

7. There should be experimentation on methodological innovations to bridge the gap between bio-medical and socio-behavioural orientations in medical education. For example, exposing the medical students to the entire spectrum of sensory tracts (anatomy), physiology of sensation (physiology), Gestalt principles of perception (psychology), and modes of social perception (sociology, etc.) would provide integrated and correlated teaching at the basic science level.

8. It is necessary to establish a system ensuring feed-back between the health care delivery system and medical education, regarding the emergent needs and to devise methods of minimizing the gap between social sciences and agencies of social action.

Regarding questions on methodology of teaching and who should teach, the group thought that in addition to the existing methods used in medical colleges (including the community visit) methods such as clinical psycho-social case conference and socio-medical case studies should be used. In order to

impart meaningful, practical illustrations, and elucidation of the contents referred to above, as far as practicable, use should be made of cases, games, exercises, simulations, etc.

The existing text-books on psychology, sociology, and cultural anthropology will not be adequate to meet the needs of medical education. New text-books relevant to the Indian cultural context, written in a language which can be easily understood by the medical students, have to be produced, incorporating the main contents mentioned above and including research findings in these areas.

An advanced centre comprising top level psychologists, sociologists, and cultural anthropologists should be created to produce the resources and the teaching materials. Experienced social scientists may be contacted to produce case studies.

Regarding the question as to who should teach, the group felt that the person should be competent to teach the social science subjects mentioned above. To determine this, there could be a two-pronged approach.

1. Persons with a basic medical background can be oriented with the knowledge and understanding of social sciences.

The group felt that it was very necessary that competent social scientists who had sound knowledge of their subject be persuaded to join the medical colleges.

The group welcomed the emergence of new graduates with the degree of M.C.H. (Masters in Community Health), graduating from the Jawaharlal Nehru University and from the National Institute of Health Administration and Education and the degree of M.D. in Community Health. These graduates have a combination of the medical science and the social science orientation.

The group also strongly felt that some outstanding institutions such as the All India Institute of Medical Sciences (New Delhi), the Post-graduate Institute of Medical Sciences (Chandigarh), and the Institute of Medical Sciences (Varanasi) should create full chairs for social scientists who could work in close collaboration with their medical counterparts. It was hoped that this group of social scientists would strengthen the social science inputs in medical education, as well as produce relevant teaching materials and undertake relevant researches.

The group expressed its grateful thanks to the Indian Council

of Social Science Research and the University Grants Commission for providing the opportunity to deliberate on these vital issues. The group also felt that these recommendations should be widely circulated so that the authorities could take action as soon as possible.

Participants

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2. Dr. (Mrs.) Kamla Gopal Rao (National Institute of Health Administration and Education, New Delhi).
3. Dr. I. D. Bajaj (Director-General of Health Services, New Delhi).
4. Dr. J. S. Neki (All India Institute of Medical Sciences, New Delhi).
5. Dr. (Mrs.) P. Ramalingaswami (Jawaharlal Nehru University, New Delhi).
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9. Dr. R. K. Sanyal (National Institute of Family Planning, New Delhi).
10. Dr. M. C. Sanyal (Armed Forces Medical College, Poona).
11. Dr. Banwari Lal (Planning Commission, New Delhi).
12. Dr. K. G. Krishnamurty (Planning Commission, New Delhi).
13. Dr. T. N. Madan (Institute of Economic Growth, Delhi University, Delhi).
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15. Dr. (Mrs.) Leela Dube (Saugar University, Sagar).
16. Dr. Udai Pareek (Indian Institute of Management, Ahmedabad).

PART II

Background Papers

ADMINISTRATORS OF TECHNICAL INSTITUTIONS : VIEWS ON SOCIAL SCIENCES

Yogesh Aial

I. Prefatory

SOCIAL SCIENCES have gained entry into technical institutions. In several institutions at some level or another in the undergraduate classes, social sciences are taught to students of agriculture, engineering, and medicine. However, though there is some recognition of social sciences, they have not been received with the same enthusiasm and warmth everywhere. Apart from resentment expressed by students, it is said that teachers from other departments as well as the heads of technical institutions acknowledge the importance of social sciences only half-heartedly.

To get an idea of the extent to which social sciences have become an integral part of the system of technical education, a survey was conducted among the heads of these institutions.

On enquiring, it was found that out of a total of 399 teaching institutions of agriculture, engineering, and medicine, only 151 have social science faculties. We approached the heads of these institutions through a mailed questionnaire. Only 73 (48.34%) responded. Table 1 provides the breakdown.

Table 1. Response rate

Institution	Request sent	Replies received	Response rate
Agricultural	53	25	47.17
Engineering	53	22	41.51
Medical	45	26	57.77
Total	151	73	48.34

The status-wise distribution of respondents is given in Table 2.

Table 2. Position of respondents

Status of respondent	Institution			Total
	Agricultural	Engineering	Medical	
Vice-chancellor	—	1	—	1
Director	2	1	4	7
Principal	13	19	16	48
Others	10	1	6	17
Total	25	22	26	73

II. Views on the place accorded to social sciences

We wanted to know about the status given to social sciences in the institutions headed by our respondents. A series of questions were asked to ascertain this. These questions related to the role of social sciences, the position social science subjects occupy in the curricula, the allocation of marks and time, the present requirements of the social scientists, and the evaluation of the performance of the social scientists.

1. *Role of social sciences*

One of the questions asked with reference to this was : "How would you describe the role of social sciences in an institution such as yours?" Table 3 gives the distribution of responses.

The overwhelming majority (77.27%) of the heads of the engineering institutions said that social sciences were meant to serve the twin functions of liberalizing education and of contributing to the vocational training of students. The corresponding figures for medical and agricultural institutions were 53.84 and 40 per cent respectively. It is interesting that not a single respondent from the medical institutions suggested that social sciences were only a part of liberal education. Even in agricultural and engineering institutions, the number of persons

Table 3. Role of social sciences

Role assigned	Institution			Total
	Agricultural	Engineering	Medical	
A part of liberal education	1 (4.00)	2 (9.09)	—	3 (4.12)
Helpful in professional training	11 (44.00)	3 (13.64)	12 (46.16)	26 (35.62)
Meant to serve both purposes	10 (40.00)	17 (77.27)	14 (53.84)	41 (56.16)
Other	1 (4.00)	—	—	1 (1.36)
No response	2 (8.00)	—	—	2 (2.74)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

mentioning this was very small (1 and 2 respectively). In the entire sample, 35.62 per cent mentioned that these subjects were helpful in professional training. If we combine the frequencies of the responses indicating twin functions, the total adds up to 67, which is 91.78 per cent.

2. Position in the curricula

The above-mentioned aims regarding the role of social sciences would lead one to expect that these subjects would be given a very important place in the curricula. To investigate this, the respondents were asked to indicate whether social sciences occupied "nominal", "important", or "very important" place in the undergraduate curriculum of their institution. The responses are given in Table 4.

From a close examination of the responses it appears that though the respondents recognized the need for the inclusion of social sciences they did not assign them a very important place. This is quite natural. Social sciences do not constitute the core of a technical educational curriculum and their departments are largely service departments. Their contribution in the training is likewise limited. Thus, 35.62 per cent of the

Table 4. Position in the curricula

Position assigned	Institution			Total
	Agricultural	Engineering	Medical	
Very important	8 (32.00)	1 (4.55)	4 (15.38)	13 (17.81)
Important	11 (44.00)	9 (40.90)	9 (34.62)	29 (39.73)
Nominal	5 (20.00)	12 (54.55)	9 (34.62)	26 (35.62)
Not applicable	1 (4.00)	—	4 (15.38)	5 (6.84)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

respondents said that social sciences were accorded a "nominal" place in the curricula. Out of the three disciplines, the percentage of respondents who said that social sciences were given only a nominal place was the highest among those from engineering institutions (54.55%). Agricultural institutions differed in that 32 per cent said that they occupied a "very important" place, and 44 per cent said they occupied an "important" place. This means that a total of 76 per cent of the respondents from agricultural institutions felt that social sciences were given importance in the curriculum. In engineering institutions this combined percentage was only 45.45 and in medical institutions it was 50.

3. *Present allocation of marks*

The respondents were asked to comment whether the present allocation of marks to social sciences was satisfactory. Fifty-six per cent of the respondents were satisfied with the present allocation of marks. In agricultural and engineering institutions the percentage of those expressing satisfaction was as high as 68 per cent, but in medical institutions the percentage was only 34. This may be because in 11 of the medical institutions no marks were allotted specifically to social sciences. Also, there were 6 institutions for which this question was not applicable.

Only 10.96 per cent felt the present allocation of marks to be unsatisfactory.

Table 5. Allocation of marks in undergraduate courses

Allocation of marks	Institution			Total
	Agricultural	Engineering	Medical	
Satisfactory	17 (68.00)	15 (68.18)	9 (34.62)	41 (56.16)
More than necessary	—	—	—	—
Less than necessary	2 (8.00)	4 (18.18)	2 (7.69)	8 (10.96)
No marks are allotted	4 (16.00)	2 (9.09)	11 (42.31)	17 (23.29)
Other	1 (4.00)	—	—	1 (1.37)
Not applicable	1 (4.00)	1 (4.54)	4 (15.38)	6 (8.22)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

4. Time allocation

A similar trend is seen in the attitude towards the allotment of time to social sciences. Sixty-three per cent of the respondents regarded it as adequate, as against 19.18 per cent who said that it was not adequate. The heads of the agricultural institutions numbered most among those who felt that the time allocation was adequate. They constituted 80 per cent of the sub-sample followed by 68.18 per cent of the heads of engineering institutions. In medical institutions only 42.31 per cent regarded the time allocation as adequate.

5. Strength of the social science faculty

A question was asked about the adequacy of the strength of the social science faculty in the institutions of the respondents.

Table 6. Time allocation

Time allocation	Institution			Total
	Agricultural	Engineering	Medical	
Adequate	20 (80.00)	15 (68.18)	11 (42.31)	46 (63.01)
Not adequate	2 (8.00)	5 (22.73)	7 (26.92)	14 (19.18)
Question does not arise	—	2 (9.09)	7 (26.92)	9 (12.33)
Cannot say	1 (4.00)	—	—	1 (1.37)
No response	2 (8.00)	—	1 (3.85)	3 (4.11)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

Seven of the heads of institutions said that they did not have any social science faculty, and three did not respond. Of those who replied, 34 (46.58 %) regarded the strength as adequate. However, half of the heads of engineering institutions reported that the strength of the social science staff was inadequate as did 42.31 per cent of the heads of medical institutions and 28 per cent of the heads of agricultural institutions.

Table 7. Strength of social science faculty

Strength	Institution			Total
	Agricultural	Engineering	Medical	
Adequate	14 (56.00)	8 (36.36)	12 (46.15)	34 (46.58)
Not adequate	7 (28.00)	11 (50.00)	11 (42.31)	29 (39.72)
Do not have social science faculty/ question does not arise	2 (8.00)	3 (13.64)	2 (7.69)	7 (9.59)
No response/not applicable	2 (8.00)	—	1 (3.85)	3 (4.11)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

Those who said that the strength was inadequate were asked, in a supplementary question, to explain the inadequacy. The replies given by them are :

People are not available or willing to come	3
Posts do not exist because of paucity of funds	16
Both the factors	2
Other responses	8
	<hr/>
Total	29
	<hr/>

It is clear that it is not the non-availability of persons but the non-existence of posts that has been responsible for the inadequate strength of the social science faculty.

6. Job requirements

Social scientists teaching in these institutions are required to do a number of things besides teaching undergraduate and post-graduate classes. Some of them guide doctoral students, others engage in research projects or participate in the extra-curricular activities of the institution.

The details of the activities in which the social scientists working in these institutions are involved are listed in Table 8.

7. Evaluation of the performance of the social scientists

The status of the discipline depends to some extent upon the manner in which social scientists perform their role. In order to compare their performance with other colleagues in the institution, we included a question regarding the performance of the social scientists. A comparison was to be made in terms of the academic qualifications of the social science teachers, their contribution to teaching, research, and extra-curricular activities. This was to be done *via-à-vis* teachers in sister departments of the institution. Table 9 gives this comparison.

The overall picture that emerges from Table 9 is quite favourable to the social scientists. In academic qualifications, contribution to teaching, and contribution to extra-curricular work

Table 8. Involvement of social scientists in various activities of the institutions

Activity	Institution			Total
	Agricultural	Engineering	Medical	
1. Teaching undergraduate classes	10	18	11	39
2. Teaching post-graduate classes	3	—	3	6
3. Teaching both	11	2	4	17
4. Guiding doctoral students	6	1	4	11
5. Doing research	14	5	6	25
6. Helping other colleagues in their research activity	6	1	9	16
7. Taking care of student welfare activities	12	6	7	25
8. Cultural and other activities of the college	4	3	5	12
9. No response	2	2	4	8

of the institution social scientists were considered to be as good as other faculty members. With regard to contributions to research, however, the impression of the heads of the institution were less favourable. Only 39.73 per cent said that their contributions were "as good as" that of the other faculty members and 17.80 per cent felt that it was definitely "worse than" that of other faculty members. On all these questions, though quite a substantial number refrained from making any comments. The non-response rate ranged from 21.92 per cent to 36.99 per cent.

By assigning weights of 2, 1, and 0 respectively to the response categories "better than", "as good as", and "worse than", we have computed mean scores for each of the four items for the three sets of institutions, and for the total sample population. The results are given in Table 10.

Table 9. Social science teachers in comparison with other teachers

Comparison category	Institution			Total
	Agricultural	Engineering	Medical	
As good as	19 (76.00)	16 (72.72)	13 (50.00)	48 (65.75)
Better than	1 (4.00)	2 (9.09)	2 (7.69)	5 (6.85)
Worse than	—	1 (4.55)	2 (7.69)	3 (4.11)
No response	5 (20.00)	3 (13.64)	9 (34.62)	17 (23.29)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)
<i>Contribution to teaching</i>				
As good as	18 (72.00)	16 (72.73)	15 (57.69)	49 (67.17)
Better than	2 (8.00)	1 (4.55)	3 (11.54)	6 (8.22)
Worse than	—	2 (9.09)	—	2 (2.74)
No response	5 (20.00)	3 (13.64)	8 (30.77)	16 (21.92)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)
<i>Contribution to research</i>				
As good as	12 (48.00)	7 (31.82)	10 (38.46)	29 (39.73)
Better than	2 (8.00)	—	2 (7.69)	4 (5.48)
Worse than	4 (16.00)	8 (36.36)	1 (3.85)	13 (17.80)
No response	7 (28.00)	7 (31.82)	13 (50.00)	27 (36.99)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)
<i>Contribution to extra-curricular activities of the institute</i>				
As good as	15 (60.00)	14 (63.64)	12 (46.15)	41 (56.16)
Better than	3 (12.00)	—	1 (3.85)	4 (5.48)
Worse than	—	3 (13.64)	1 (3.85)	4 (5.48)
No response	7 (28.00)	5 (22.72)	12 (46.15)	24 (32.88)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

Table 10. Mean score values on evaluation scale

Item	Institution			Total
	Agricultural	Engineering	Medical	
Academic qualification	0.84	0.91	0.73	0.79
Contribution to teaching	0.88	0.82	0.81	0.84
Contribution to research	0.64	0.32	0.54	0.51
Contribution to extra-curricular activities	0.84	0.64	0.54	0.67
Consolidated score	0.80	0.67	0.65	0.72

Though the performance of the social science teachers had been rated by the heads of these institutions as comparable to that of their colleagues, the index values indicate a slightly lower ranking. The index is close to 1 in the case of teachers in the agricultural institutions, but in the other two institutions it is much lower. In fact, in terms of contributions to research, the social science teachers in engineering institutions have a very poor rating indeed.

III. Attitude of other teachers and students towards social scientists

Specific questions were asked of the respondents regarding the attitudes of the students and of the teachers from other departments towards the inclusion of social sciences. The responses indicate that among both these groups the preponderant attitude is one of indifference. Of the respondents 50.68 per cent teachers and 46.58 per cent of students were neutral.

However, students and teachers are not viewed as hostile in all institutions. In only five institutions were teachers reported to be hostile to the social scientists and in six institutions students were regarded as hostile. Among the teachers, hostility was the greatest among teachers of agricultural and engineering institutions and among the students it was the greatest among

those from agricultural institutions. Details are given in Tables 11 and 12.

Table 11. Attitude of teachers

Attitude	Institution			Total
	Agricultural	Engineering	Medical	
Hostile	2 (8.00)	2 (9.09)	1 (3.85)	5 (6.85)
Neutral	12 (48.00)	13 (59.09)	12 (46.15)	37 (50.68)
Hospitable	11 (44.00)	7 (31.82)	11 (42.31)	29 (39.73)
Not replied/ Can't say	—	—	2 (7.69)	2 (2.74)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

Table 12. Attitude of students

Attitude	Institution			Total
	Agricultural	Engineering	Medical	
Hostile	4 (16.00)	1 (4.55)	1 (3.85)	6 (8.22)
Neutral	10 (40.00)	12 (54.54)	12 (46.15)	34 (46.57)
Hospitable	11 (44.00)	8 (36.36)	11 (42.31)	30 (41.10)
Other	—	1 (4.55)	2 (7.69)	3 (4.11)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73. (100.00)

IV. Problems faced by social scientists

Apart from the attitude of the teachers and students, which may be indifferent, hospitable, or hostile, there may be some other problems which social science teachers have to confront. The heads of the institutions may have been approached for their solution, or they may even be able to identify them on their own. In our questionnaire a question was included to this effect. The respondents were asked : "Are there any problems, you think, social scientists face in your institutions?" The problems identified by them are given in Table 13.

It may be noted that 50.68 per cent of the heads of the institutions were of the view that there were no specific problems for the social scientists. Another eight per cent did not comment on this question. The major problems of those identified were the lack of a post-graduate programme and the lack of facilities for communication with the colleagues of their profession working in the universities. Lack of library facilities was another problem identified by them.

These responses may be contrasted with another set of responses to the question : "Do you think that adequate opportunities are provided to the social scientists in your institution for their professional and career advancement?"

Table 14 gives the distribution of responses.

It is striking that 27 per cent of the heads of institutions felt that social scientists did not have any scope in the institution for their career advancement. An additional 19 per cent conceded that opportunities for their advancement were only "somewhat adequate." However this feeling was less in agricultural institutions. About half of the heads from agricultural universities and colleges covered by the study claimed that adequate opportunities and facilities did exist for the social scientists. This claim was made by only one-third of the heads of engineering institutions, and less than one-fourth of those from medical institutions.

Table 13. Problems faced by social scientists

Problem	Institution			Total
	Agricultural	Engineering	Medical	
No problems	16 (64.00)	9 (40.90)	12 (46.15)	37 (50.68)
Do not have Post-graduate programme of their own	4 (16.00)	3 (13.61)	1 (3.85)	8 (10.96)
Communication with professional colleagues in other centres not possible	1 (4.00)	1 (4.55)	2 (7.69)	4 (5.48)
Lack of library facilities	1 (4.00)	1 (4.55)	—	2 (2.74)
Lack of library facilities and do not have Post-graduate programme of their own	—	1 (4.55)	1 (3.85)	2 (2.74)
Lack of library facilities and communication with professional colleagues in other centres not possible	—	1 (4.55)	1 (3.85)	2 (2.74)
Do not have Post-graduate programme of their own and communication with professional colleagues in other centres not possible	—	2 (9.09)	2 (7.69)	4 (5.48)
Lack of library facilities; do not have Post-graduate programme of their own and communication with professional colleagues in other centres not possible	1 (4.00)	1 (4.55)	—	2 (2.74)
Other	1 (4.00)	2 (9.09)	3 (11.54)	6 (8.22)
Not replied/not applicable	1 (4.00)	1 (4.55)	4 (15.38)	6 (8.22)
Total	25 (100.00)	22 (100.00)	26 (100.00)	73 (100.00)

Table 14. Percentage distribution of respondents by adequacy of opportunities for advancement

Opportunities for Professional Advancement	Institution			Total N=73
	Agricultural N=25	Engineering N=22	Medical N=26	
Adequate	48.00	31.82	23.08	34.25
Somewhat adequate	20.00	18.18	19.23	19.18
They do not have much scope here	12.00	36.36	34.61	27.40
No response	20.00	13.64	23.08	19.18

V. Job satisfaction

Job satisfaction is related to the aspirations of the job-doers and with their assessment of how facilitating the environment is. None of the heads of the institutions said the social scientists working with them were "highly satisfied". Only 35.62 per cent said they were "quite satisfied". Those who said they were "dissatisfied" or "highly dissatisfied" numbered 10(13.70%). Of the three, dissatisfaction seems to be greatest in medical institutions. Of the respondents 15.38 per cent said the social science teachers working with them were dissatisfied, compared to 13.64 per cent of those from engineering institutions and 12 per cent of those from agricultural institutions.

Table 15. Percentage distribution of administrators perceptions of job satisfaction among social scientists

Description	Institution			Total N=73
	Agricultural N=25	Engineering N=22	Medical N=26	
Highly dissatisfied	4.00	4.55	—	2.74
Quite dissatisfied	8.00	9.09	15.38	10.96
Somewhat satisfied	24.00	45.45	34.62	34.25
Quite satisfied	48.00	27.27	38.77	35.62
No response	16.00	13.64	19.23	16.44

VI. Involvement of the social scientists

The respondents generally felt that the social science teachers in their institutions joined with others to work as a team. Only in agricultural (3) and in engineering (3) institutions were there complaints that they would not mix. In 31(42.47%) institutions mixing was found to a considerable extent. However, there was greater participation in agricultural institutions (56%) compared to the other two.

VII. Personal views on social sciences

It will now be useful to consolidate the views of the heads of institutions on the role of social sciences in the teaching programme meant for agricultural, engineering, and medical graduates.

Four statements were supplied and the respondents were asked to specify the extent of their agreement with each of them. The responses are presented in Table 16.

Upon inspection of the response pattern in Table 16, it emerges that the attitude of the administrators towards social sciences was generally indifferent. If we assign the highest value (5) to the response that favoured social sciences and the lowest value (1) to that which went against social sciences, the mean score for all the four statements, for the entire sample of 73 persons, came to 3.37. While most were of the view that the introduction of social sciences in the undergraduate curriculum was not a mistake, they felt that "social sciences have yet to prove their usefulness" and that the policy makers "have just given lip-service for teaching of social sciences; they really did not mean inclusion of social sciences seriously".

Opinions were also sought from the respondents regarding the nature of social science courses to be taught to these special student audiences. The question was phrased thus : "Various views prevail regarding the nature of social science courses to be given to professional students like the ones you teach. Some think that discipline-wise courses should be given as in the universities; others opine that inter-disciplinary courses should be instituted; still others feel that vocationally oriented courses

Table 16. Percentage distribution of respondents by agreement on statements regarding the role of the social sciences

Statement	Strongly agree	Quite agree	Neither agree nor disagree	Quite disagree	Strongly disagree	NR	Mean Score
1. Social sciences have yet to prove their usefulness for professional education	19.18	30.14	6.85	28.70	12.33	2.74	2.8
2. Experience in the past shows that the introduction of social sciences in the undergraduate curriculum was a mistake.	—	—	8.22	46.58	38.36	6.85	4.3
3. Technical students welcome the inclusion of social sciences	13.70	39.73	23.29	15.07	1.37	6.85	3.5
4. Policy-makers have just given lip-service for teaching of social sciences; they really did not mean inclusion of social sciences seriously	13.70	23.29	17.81	26.03	8.22	10.96	2.9

should be planned for each of the social science disciplines. What is your opinion?"

The responses to this question are summarized in Table 17.

The general recommendation is for inter-disciplinary and vocationally oriented courses as is evident from Table 17. This pattern is present in all the three sets of institutions.

Table 17. Nature of social science courses recommended

Nature of course	Institution			Total
	Agricul- tural	Engi- neering	Medical	
Discipline-wise courses as in the university	2 (8.00)	—	4 (15.38)	6 (8.21)
Inter-disciplinary courses	9 (36.00)	8 (36.36)	10 (38.46)	27 (36.99)
Vocationally oriented disciplinary based courses	10 (40.00)	11 (50.00)	7 (26.92)	28 (38.36)
Discipline-wise courses and inter-disciplinary courses	1 (4.00)	—	1 (3.85)	2 (2.74)
Discipline-wise courses and vocationally oriented	1 (4.00)	—	1 (3.85)	2 (2.74)
Inter-disciplinary courses and vocationally oriented courses	1 (4.00)	1 (4.55)	1 (3.85)	3 (4.11)
Other	—	1 (4.55)	1 (3.85)	2 (2.74)
No response	1 (4.00)	1 (4.55)	1 (3.85)	3 (4.11)
Total	25 (100.00)	26 (100.01)	22 (100.01)	73 (100.00)

VIII. Summary

The analysis attempted above is based on responses from 73 of the 151 teaching institutions, whose heads were approached

to give their views on the social sciences and their role in professional education. From all the three sets of institutions a similar number of responses was received. The data, thus, became comparable.

We may summarize here the situation in the three sets of institutions.

Agricultural institutions

Seventy-six per cent of the respondents from the agricultural institutions asserted that in their institutions social sciences were assigned an important place in the curricula. Both the time and the marks allocated had been considered adequate. It was their view that the social science faculty did not face any problems; the attitude of teachers from other departments and of students was described by them as somewhat favourable. On a 0-2 scale, the values were 1.36 for teachers and 1.28 for students. Only 12 per cent of the heads felt that the social scientists "do not have much scope here".

Engineering institutions

In the 22 institutions covered by the survey, more than half had assigned only a nominal place to social sciences in their curricula. Even then, 68 per cent of the respondents felt that the marks and time allotted for these courses were adequate. Half of the heads of institutions confessed that the staff for teaching social sciences was not adequate, but owing to the paucity of funds, posts could not be created. The present staff was evaluated by them as mediocre (on a 0-2 scale, the value was 0.67) compared to teachers in other departments. Other teachers and students had also not fully accepted social sciences. The scores were 1.22 and 1.27 respectively on a 0-2 scale. Because of the absence of a post-graduate programme and barriers to communication with their professional colleagues in the universities, the social science teachers were said to suffer from a sort of relative deprivation. More than a third of the heads of these institutions felt that there was very little scope for career advancement for social scientists in these institutions.

Medical institutions

The data related to 26 institutions. It was found that in half of them social sciences had an important place while in the other half they just had nominal significance. The heads of the institutions were greatly dissatisfied over the allotment of marks and time to social sciences; 66 per cent showed their dissatisfaction over the allotment of marks and 58 per cent were unhappy about the time allocation. The heads of 42 per cent institutions felt that the staff was not adequate, though they could not improve the situation.

The existing faculty was rated lower than the teachers in other faculties. In fact, their score was lower than that for social scientists working in agricultural and engineering institutions. The attitude of teachers and of students was also somewhat indifferent (scale value = 1.3).

Summing up

Social sciences and social scientists have not yet gained full recognition in these institutions. Even in agricultural institutions, where the administrators have assigned an important place to social sciences, other teachers and students are generally indifferent—at least this is the perception of the heads of the institutions. It is, however, heartening that their attitude is not hostile. On a five point-scale to measure their hostility, the mean value obtained is 3.37 which is indicative of indifference with a slant towards the positive side. Of the administrators, 77.3 per cent feel that social sciences in their institutions have to perform the twin functions of liberalizing and of equipping students professionally. For this they have shown preference for inter-disciplinary and vocationally oriented courses.

The present faculty in these institutions is regarded by them as substandard. Efforts are needed both to enlarge the size of the social science faculty and to strengthen it academically.

SOCIAL SCIENTISTS IN TECHNICAL INSTITUTIONS

Yogesh Atal

I. Introduction

THE FOLLOWING is a report on social scientists working in educational institutions for training agricultural scientists, doctors, and engineers. Social scientists in institutions of this type are not only in a new role but also in a somewhat different setting. The academic climate in such institutions is charged with an air of "professionalism" and the social scientist arrives there more or less as a stranger.

For this study we wanted to cover the entire universe of social scientists in agricultural, medical, and engineering institutions. Lists of teaching and training institutions for these professions were obtained from a variety of sources from the different States in India. In all there were 399 institutions. A request was sent to all these institutions for a list of social scientists working with them. Out of the 399 institutions approached 195 responded. Their distribution is shown in Table 1. Some responses were negative (e.g., "We have no social scientists on our faculty"). Nevertheless, we were able to obtain a fairly large list of social scientists whom we approached through a mailed questionnaire.

It is clear from Table 1 that more than half of the institutions did not respond to our communication. Presumably they do not impart any instruction in social sciences. From among those who did respond, 44 were negative responses—42 did not have any social science faculty, and did not invited guest lecturers. Thus, only 151 institutions out of 399 had a regular programme of social science teaching and training (Table 2).

The data must be interpreted with caution, however. It is common knowledge that all the medical colleges are required

Table 1. Institutions approached

Institution	No. of institutions approached	No of institutions responded	Response rate
<i>Agricultural</i>			
Agricultural colleges/universities	73	40	57.79
Veterinary colleges	21	11	52.38
Home science college	5	2	40.00
Agricultural engineering colleges	7	3	42.86
Dairy science colleges	4	3	75.00
Sub-total	110	59	53.64
<i>Engineering</i>	130	59	45.38
<i>Medical</i>			
Medical colleges/institutes	95	51	53.69
Nursing colleges	23	11	47.82
Dental colleges	16	6	37.50
Others	25	9	36.00
Sub-total	159	77	48.42
Grand total	399	195	48.87

Table 2. Institutions teaching social sciences

Profession	Total number of institutions	Institutions that teach social sciences	Percentage
Agriculture	110	53	48.18
Engineering	130	45	34.61
Medicine	159	53	33.33
Total	399	151	37.84

to teach a course in preventive and social medicine (P.S.M.), besides some specific courses in sociology, psychology, and psychiatry. In most colleges these courses are given by doctors having their M.D. degree in Preventive and Social Medicine. There

is, however, considerable ambivalence as regards their status. Some medical colleges have described them as social science faculty, while others have not. From the latter group only the names of those persons who were working as demonstrators and research assistants were received. A similar situation was observed in the case of agricultural institutions. People belonging to the extension department are the "marginal" men—agricultural scientists regard them as social scientists, but social scientists are not prepared to admit them in their category. Such a situation has not arisen in the case of engineering institutions where the faculty is recruited mainly from among the social scientists. However, in these institutions a different kind of problem was experienced. The social science departments in engineering institutions are generally called departments of humanities and social sciences. In these composite departments a heterogeneity of specializations is possible; for example, English literature, philosophy, social sciences. In the lists supplied by the institution, this distinction was ignored in many cases. A large number of such cases, therefore, had to be eliminated from our study. We included one lecturer in English literature since he was also conducting classes in economics.

The respondents

The lists supplied by the 151 institutions were consolidated and questionnaires were sent to all the social scientists whose names were obtained through the above procedure. The list consisted of 738 social scientists. Their distribution in the three sets of institutions and their response rate are shown in Table 3.

The overall response rate of 52.30 per cent, although attained after some chasing, is quite heartening. The highest response rate was among the social scientists working in agricultural institutions (59.51%) and the lowest was among those working in medical institutions (45.35%). The response rate in engineering institutions was 48.55 per cent.

The social scientists are fairly well distributed over the different States. Table 4 gives their distribution.

Table 3. Respondents by institution

Institution	Number approached	Number responded	Response rate
<i>Agricultural</i>			
1. Agricultural colleges & universities	285	167	58.59
2. Other related institutions	46	30	65.21
Sub-total	331	197	59.51
<i>Engineering</i>			
	138	67	48.55
<i>Medical</i>			
1. Medical colleges	168	73	43.45
2. Other related institutions	101	49	48.51
Sub-total	269	122	45.35
Total	738	386	52.30

Table 4. Respondents by States

State	Institution			Total
	Agricul- tural	Engi- neering	Medical	
Andhra Pradesh	12	2	15	29
Assam	2	—	—	2
Bihar	6	7	7	20
Gujarat	9	1	14	24
Kerala	7	5	4	16
Jammu & Kashmir	—	1	—	1
Madhya Pradesh	13	5	10	28
Maharashtra	24	7	12	43
Mysore	22	4	10	36
Orissa	25	—	7	32
Haryana	15	2	2	19
Punjab	20	—	1	21
Rajasthan	10	10	8	28
Tamil Nadu	9	8	4	21
Uttar Pradesh	21	10	5	36
West Bengal	1	2	3	6
Delhi	—	3	20	23
Himachal Pradesh	1	—	—	1
Total	197	67	122	386

Questionnaire

Though small in number, the respondents were widely scattered over the different States. The only possible way to interview them was through a mailed questionnaire. The Study Team made an inventory of items of information required and prepared a preliminary draft based on these items. This draft was pretested in some institutions after which it was thoroughly revised. The final precoded questionnaire was mailed to all the social scientists working in the institutions mentioned earlier. The responses received from the social scientists are the subject-matter of this report.

The major findings of the study are present in the following three sections. The data on demographic and academic background are presented in Section II. How social science teachers feel in the setting of technical institutions is analysed in Section III. After presenting their views on different matters related to their role performance, an effort has been made to construct two indices: (i) social science acceptability index, and (ii) contentment-frustration index for social science teachers. The last section gives a summary of the findings.

II. The social science faculty: a profile

Who are the people who teach social sciences in the "technical" institutions? What is their age group? What is their academic background? What has been their occupational history? These are the initial questions that must be asked. We attempt to answer them in this section.

Size of the social science faculty

In the 151 institutions on which information is available, there are, on an average, five persons on the faculty (Table 5). In the engineering institutions, this average is 3.02; in medical institutions it is 5.05; and in agricultural institutions it is 6.24. The size ranges from 1 to 18 persons in case of agricultural and medical institutions. In engineering colleges the range is 1 to 7 although there is one institution with 15 persons on the social

science faculty. If this institution is excluded the average size for engineering institutions further falls to 2.7.

Table 5. Institutions by size of faculty

Size	Institution			Total
	Agricul- tural	Engi- neering	Medical	
1	6	18	7	31
2	11	10	5	26
3	5	3	8	16
4	2	3	7	12
5	8	4	4	16
6	21	7	22	50
Total	53	45	53	151
Average	6.24	3.02	5.05	4.92

Types of social scientists

Two major types of social scientists can be identified from the respondents. They are (i) those with basic degrees in the social sciences and (ii) those with professional degrees but with a specialization in some social science aspects. In the first category are those teachers who have done their masters degree in any of the social sciences; in the second are included doctors specializing in preventive and social medicine as well as agricultural scientists specializing in agricultural extension (or in some other branch of agriculture) and yet participating in the social science teaching programme. Based on the composition of the faculty, the institutions fall in one of three categories:

1. Institutions having social scientists of category "i"
2. Institutions having social scientists of category "ii"
3. Institutions having social scientists of both categories.

This kind of situation exists in all the three fields. However, engineering institutions are largely served by social scientists of

category "i". In both agricultural and medical institutions, there is a preponderance of teachers with their basic degrees in agriculture and medicine respectively. This is clear from Table 6.

Table 6. Social science faculty by academic degree

Institution	N	%
<i>Agricultural institutions</i>		
1. Teachers with basic degrees in social sciences	41	20.81
2. Teachers with basic degrees in agriculture (agricultural extension, agriculture, veterinary science)	156	79.19
<i>Engineering institutions</i>		
1. Teachers with basic degrees in social sciences	59	88.06
2. Teachers with basic degrees in engineering	8	11.94
<i>Medical Institutions</i>		
1 Teachers with basic degrees in social sciences	51	41.80
2. Teachers with basic degrees in medicine/nursing	71	58.20

From the above table it can be seen that only 39.12 per cent of the teachers in these institutions can be described as real "strangers". These people have entered a new system and so face a rather severe "identity crisis". The group is the largest among the engineering teachers (88.06%) and the smallest among the teachers from agricultural institutions (20.81%). In medical institutions they constitute 41.80 per cent.

Only 44 out of the total number of teachers approached have doctoral degrees in social sciences. Sixteen of these are in agricultural institutions, 20 in engineering, and 8 in medical institutions. If we add to this number 34 teachers who have their Ph. D. in agricultural extension or some other agricultural science, the total number of teachers with doctoral degrees rises to 78 – which is 20.2 per cent of the total.

The distribution of the social science faculty by discipline is shown in Table 7.

The information in Table 7 is quite revealing. In the engineering institutions, where, in general, professionally trained

Table 7. Percentage distribution of social science faculty by field of specialization

Subject	Institution			Total N=386
	Agricultural N=197	Engineering N=67	Medical N=122	
1. Sociology and anthropology	5.58	1.49	6.56	5.16
2. Social work	0.51	—	8.20	2.85
3. Psychology	2.54	14.93	12.30	7.77
4. Psychiatry	—	—	2.46	0.77
5. Philosophy	—	2.99	—	0.52
6. Economics	9.64	41.79	1.64	12.69
7. Political science	—	10.45	0.82	2.07
8. Education	0.51	—	0.82	0.52
9. Commerce	1.52	8.96	8.82	2.59
10. Agricultural extension	48.73	—	—	24.87
11. Preventive and social medicine	—	—	51.64	16.32
12. Agriculture	28.43	—	—	14.51
13. Veterinary science	2.03	—	—	1.04
14. Nursing	—	—	4.10	1.39
15. Mechanical engineering	—	2.99	—	0.52
16. Mining engineering	—	1.49	—	0.26
17. Technical	—	7.46	—	1.30
18. English literature	—	1.49	—	0.26
19. Other	0.5	5.97	10.66	4.66

engineers do not teach social sciences, there is a greater heterogeneity of disciplines – sociology, social anthropology, psychology, commerce, economics, political science, and philosophy are represented. There are also persons with degrees in English literature and in the different engineering fields who have stated that they teach social sciences. They number 11 in a sample of 67. Both in engineering and in agriculture, teachers with degrees in economics outnumber others. They constitute 41.79 per cent of the social science faculty in engineering institutions and 9.64 per cent in agricultural

institutions. In medical and para-medical institutions, psychologists and psychiatrists account for 14.76 per cent followed by sociologists (6.56%) and persons specialising in social work (8.20%). However, in agricultural institutions, there is a preponderance of agricultural extension men (48.73 %) and in medical and para-medical institutions, of doctors who have specialised in preventive social medicine (51.64%).

Academic status of the respondents

The questionnaire was sent to social science teachers of all ranks. Since it is difficult to specify the exact number of persons in different status-positions in the various teaching institutions, we are not in a position to indicate non-response rate among different categories of teachers.

There are, however, responses from persons occupying different academic ranks in these institutions. In Table 8 we present the frequencies for each status-position.

Table 8 Percentage distribution of respondents by academic status

Academic status of the respondent	Institution			Total N=386
	Agricultural N=197	Engineering N=67	Medical N=22	
Professor/associate professor	17.6	17.91	26.22	15.28
Reader/assistant professor	11.67	13.43	13.11	12.43
Lecturer	61.42	62.68	19.67	48.44
Junior lecturer	4.06	5.97	3.27	4.14
Instructor/tutor/social worker	13.70	—	23.77	14.50
Demonstrator/research officer	1.52	—	13.93	5.18

A high percentage of respondents from agricultural and engineering institutions are Lecturers (61.42% and 62.68% respectively). In medical institutions there is no particular concentration, though between the three, the medical institutions

have the highest percentage of Professors (26.22%). Representation of Professors in agricultural institutions is comparatively much lower (7.61 %).

Foreign travel

Few of the respondents had gone abroad. The majority (70.97%) have received all their training in India. The percentage of those who have been trained in India is 76.14 for social scientists working in agricultural institutions, 68.65 for those in engineering institutions, and 63.95 for those in medical institutions. They number 274 altogether. Of the remaining, 80 had studied in foreign countries, 14 had gone for advanced training, and 18 for participating in seminars and conferences or for a pleasure trip.

As may be expected, few respondents had gone abroad more than once. Of the 112 respondents, 54 (57.14%) had gone abroad only once, 26 had gone twice, and the remaining 22 had gone thrice.

In all three sets of institutions of those who had gone abroad, the largest number had gone to the United States of America for their first visit. The same is true for the second visit.

The countries visited by the social scientists during their first trip are mentioned in Table 9.

Table 9. Countries of first visit

Country	Institution			Total
	Agricultural	Engineering	Medical	
U.S.A.	42	11	22	75(66.96%)
U.K.	1	6	12	19(16.96%)
Middle Eastern countries	1	—	1	2(1.78%)
U.S.S.R.	—	—	1	1(0.89%)
African countries	—	—	1	1(0.89%)
South-East Asian countries	—	—	1	1(0.89%)
Other countries	3	4	6	13(11.60%)
Total	47	21	44	112(99.97%)

Age group

The respondents were all quite young. In all the three sets of institutions, the modal value lies in the age group 26 – 35 which consists of 47.41 per cent of the teachers. In agricultural institutions, this percentage is 51.77; in engineering institutions it is 40.29; and in medical institutions it is 44.26. The distribution is shown in Table 10.

Table 10. Percentage distribution of social scientists by age group

Age group	Institution			Total N=386
	Agricul- tural N=197	Engi- neering N=67	Medical N=122	
Below 25	6.59	5.97	3.20	5.44
26-35	51.77	50.29	44.26	47.41
36-45	33.50	29.85	31.96	32.38
46-55	5.58	16.41	15.51	10.62
55 and above	0.50	4.47	4.09	2.33
Not mentioned	2.03	2.98	0.82	1.81

Teaching experience

Since there is a heavy concentration of young people in the sample, it is not surprising that most of the social science teachers have only a few years of teaching experience. Three per cent of them have taught for less than a year, and 33 per cent have taught between 1 and 5 years. Another 31 per cent have teaching experience ranging between 5 and 10 years.

For the three sets of institutions, the figures for teaching experience are given in Table 11.

Research guidance

Some of the teachers also guide students for the Ph.D. or M.D. in P.S.M. However, their number is small, consisting of only 8.62 per cent of teachers in agricultural institutions, 13.12

Table 11. Teaching experience

Teaching experience (years)	Institution			Total
	Agricultural	Engineering	Medical	
Less than one	6	6	—	12(3.10%)
1-5	71	45	12	128(33.16%)
5-10	70	35	14	19(30.82%)
10-15	33	22	16	71(18.39%)
15+	16	13	25	54(13.98%)
No response	1	1	—	2(0.51%)
Total	197	122	67	{ 386(99.96%)

per cent of those in engineering institutions, and 13.12 per cent of those in medical institutions.

Table 12. Guidance of Ph.D. students

Nature of guidance	Institution			Total
	Agricultural	Engineering	Medical	
Independent	17(8.62)	9(13.43)	6 (4.92)	32 (8.29)
Co-guide	—	—	5 (4.10)	5 (1.29)
Both	—	—	5 (4.10)	5 (1.29)
Not applicable	180(91.37)	58(86.57)	106 (86.88)	344 (89.13)
Total	197 (100.00)	67 (100.00)	123 (100.00)	386 (100.00)

It should be mentioned that 48.7 per cent of the respondents do not have any research papers to their credit. The percentage is the highest among the teachers in medical institutions (57.37%), followed by those in engineering (46.26%) and agricultural (44.16%) institutions (data not given).

Inter-institutional mobility

The faculty consists both of those who have changed one or

more institutions and also of those who have not. Unfortunately 41 (10.6%) did not respond to our question on occupational history. The remaining are classified as "changers" and "non-changers". The distribution of the three categories of teachers in the three sets of institutions is shown in Table 13.

Table 13. Percentage distribution of respondents by mobility

Mobility	Institution			Total
	Agricultural	Engineering	Medical	
Changers	42.14	58.22	51.65	47.93
Non-changers	50.25	20.89	38.51	41.45
No response	7.61	20.89	9.83	10.62

If we assume that those who did not respond are also non-changers it appears that there is greater inter-institutional mobility among the social scientists working in engineering institutions as compared to the other two types of institutions. Of course, there is greater stability in agricultural institutions. The inter-institutional mobility in the sub-sample from the medical institutions differs significantly from the mobility among the social science faculty in engineering institutions. The latter have moved largely from those colleges and universities where they were teaching conventional courses in individual social science departments. The former, that is, the teachers in medical institutions, have moved largely from one medical college to another. A similar pattern is noticeable even among the social scientists working in agricultural institutions. The reasons for higher mobility among social scientists in engineering institutions is the relatively recent introduction of social sciences in the curricula, and the recruitment of those who have their basic degrees in social sciences. There is no course equivalent to P.S.M. or agricultural extension for the students specializing in the field of engineering.

III. Social sciences and social scientists in a strange setting. self-assessment

The introduction of social sciences in curriculum and the recruitment of social science faculty are no guarantee of their proper reception in these institutions. Though the need for an exposure to social sciences is recognized by these institutions, it may be done for a variety of reasons. The head of the institution may personally be convinced of the utility of social sciences; the decision may be imposed from above; it may be accepted as a "fad" or the faculty may genuinely feel its need. Acceptance or rejection of social sciences by the students similarly depends upon a number of factors. For example, perception of its vocational relevance, performance of the teachers, and selection of appropriate topics for inclusion in the syllabus.

An effort has been made here to assess the extent to which social sciences have been welcomed by the technical institutions. The social science teachers were asked a series of questions regarding this. The questions related to the status accorded to the social science courses in the curricula, students' attitudes towards these courses and the adjustment of social scientists in the milieu as reflected by the attitude of other teachers and administrators towards them. The degree to which the respondents feel relatively deprived has also been assessed.

Working conditions in the institutions

Teaching load : Compared to the social scientist teaching in the universities the teaching load of the respondents is not heavy. In the universities, a professor is required to teach a minimum of 8 hours, a reader 12 hours and a lecturer 16 hours. The average hours per week for different categories of the staff are given in Table 14.

It appears that there is a relatively lighter teaching load for the social science faculty in these institutions. This is understandable. Social sciences are peripheral in the curricula and they are assigned fewer hours in the teaching schedule.

Other assignment : Social scientists are generally required to look after the extra-curricular activities of the institutions.

Table 14. Teaching load (hours per week)

Category	Institution		
	Agricultural	Engineering	Medical
Professor	6.90	9.45	7.35
Reader	9.19	9.50	6.76
Lecturer	10.15	11.33	7.75
Junior lecturer	11.25	7.40	8.87
Instructor/ Demonstrator/Tutor	9.41	—	6.48
Research Officer	3.00	—	8.00
All categories	9.50	10.56	7.27

Apart from taking up the responsibility of heading the department (which may be fixed or rotating), they are asked to take on various other responsibilities, such as wardenship, deanship, proctorship, and assistant registrarship. They are also made "in-charge" of social work and of cultural activities. In addition, they generally attend to the activities related to student welfare. Table 15 gives further information on this.

Table 15. Percentage distribution of social science faculty by number of extra-curricular assignments

Number of extra positions	Institution			Total
	Agricultural	Engineering	Medical	
One extra	40.10	40.30	31.96	37.56
Two extra	23.35	29.85	18.85	23.05
Sub-total	63.45	70.15	50.81	60.61
None	36.55	29.85	49.19	39.39

Table 15 shows that in addition to their routine teaching load, 61 per cent of the teachers hold administrative positions and also look after extra-curricular activities. Their smaller

teaching load is amply compensated for by such assignments. In medical institutions, though these responsibilities are comparatively smaller, their teaching load is quite light (7.27 hours per week) and only 50.81 per cent of the teachers say they are involved in extra-curricular work. In engineering institutions, on the other hand, 70.15 per cent of the teachers are required to do extra-curricular work. They also have to teach for more hours. This may be related to the small size of their faculty (3.02 teachers on an average) and also to the fact that they are "non-technical" staff in that they do not possess a degree in engineering. In agricultural institutions and medical institutions, it must be remembered, the social science faculty consists largely of those who possess a "technical" degree. A stereotype that seems to prevail is that social science faculty are ideal for organising extra-curricular activities. Thus, they are asked to organize debates and elocution contests, direct one-act plays, assist in the publication of the college magazine and arrange other "functions." They have been even required to do "ghost writing" for the institution heads.

Although we do not have data on other teachers working in these institutions, it is safe to believe that it is the social science faculty which is largely engaged in extra-curricular activities. For key administrative positions, however, they are the last choice.

Perception of the place accorded to social sciences

Place assigned: The respondents were asked the general question : "What position do you think social sciences occupy in the curricula of your institution at the undergraduate level?" These respondents were classified in two categories based on their professional background : (i) Those with a "professional" background and degree, (ii) those with a social science background only. This categorization was done with a view to investigating whether there were any significant differences in the perception of the two sets of teachers.

The following points emerge from Table 16.

In general, the respondents with a professional background (such as M.Sc. in agriculture, agricultural extension, or M.D. in P.S.M., or M. Tech.) believe that social sciences have a "very

Table 16. Place accorded to social sciences in undergraduate courses

Respondents	Very Important	Important	Nominal	No undergraduate course	No response	Total
1	2	3	4	5	6	7
<i>Agriculture</i>						
1. With professional background	33(21.15)	76(48.72)	44(28.21)	—	3(1.92)	156(100.00)
2. With social sciences background only	3(7.32)	14(34.15)	23(56.09)	—	1(2.44)	41(100.00)
Sub-total	36(18.27)	90(45.69)	67(34.01)		4(2.03)	197(100.00)
<i>Engineering</i>						
1. With professional background	2(25)	3(37.5)	3(37.5)	—	—	8(100.00)
2. With social sciences background only	6(10.17)	15(25.43)	35(59.32)	1(1.69)	2(3.39)	59(100.00)
Sub-total	8(11.94)	18(26.86)	38(56.72)	1(1.49)	2(2.99)	67(100.00)
<i>Medicine</i>						
1. With professional background	11(16.18)	30(44.12)	23(33.82)	2(2.94)	2(2.94)	68(100.00)
2. With social sciences background only	10(18.52)	19(35.19)	15(27.78)	7(12.95)	3(5.56)	54(100.00)
Sub-total	21(17.21)	49(40.17)	38(31.14)	9(7.38)	5(4.10)	122(100.00)

Table 16 (contd.)

1	2	3	4	5	6	7
<i>All Institutions</i>						
1. With professional background only	46(12.92)	109(46.99)	70(30.18)	2(0.86)	5(2.15)	232(100.00)
2. With social sciences background only	19(12.92)	48(31.17)	73(47.40)	8(5.20)	6(3.89)	154(100.00)
Grand total	65(16.80)	157(40.10)	143(37.10)	10(2.60)	11(2.80)	386(100.00)

important" or "important" place in the curricula.

In the agricultural and medical institutions the highest frequencies have fallen in the "important" category, next being "nominal". Respondents mentioning "very important place" are small in number.

In the engineering institutions, social sciences are still accorded only a "nominal" place; 56.72 per cent of the teachers feel this way; only 26.86 per cent believe that the social sciences occupy an "important" position.

Barring medical institutions, teachers with only social science background generally express the feeling that social sciences occupy a "nominal place". The highest frequency falls in this category.

Marks allotted: One of the indicators of the place accorded to a subject in the curriculum is the relative weight given to it. The respondents were asked whether they were satisfied with the allocation of marks accorded to social sciences in the present undergraduate curricula. Only 44.82 per cent of the respondents said they were satisfied. While more than 50 per cent of the respondents working in the agricultural and engineering institutions were satisfied with the present allocation, only 27.04 per cent of the teachers in the medical institutions said they were satisfied. These data are quite instructive. They show that there is very little relationship between perception of the place assigned to the subject and expression of satisfaction over assignment of weightage in terms of allotment of marks. The fact that social scientists perceive that a nominal status is accorded to social science does not necessarily mean that they are unhappy about it. It is in this light that we can appreciate the seemingly anomalous data referring to teachers in the engineering institutions. While 56.72 per cent of them said that social sciences were given only a "nominal" place, 52.24 per cent expressed satisfaction over the allotment of marks; those regarding the allotment as "unsatisfactory" constituted only 10.44 per cent.

Purpose of social science teaching

The place assigned to the subject and the marks allotted to it in the curriculum are, to an extent, dependent upon the

Table 17. Percentage distribution of social science faculty expressing satisfaction with allotment of marks

Allotment of marks	Institution			Total
	Agricultural N=197	Engineering N=67	Medical N=122	N=386
Satisfactory	53.30	52.24	27.04	44.82
Not very satisfactory	35.50	26.86	26.23	31.10
Unsatisfactory	8.20	10.44	24.59	13.73
Other responses	3.00	10.46	22.14	10.35

purpose for which it is included in the syllabus. In the discussions regarding the role of social sciences in the training of agricultural scientists, engineers, and doctors, two different stands are usually taken. Teaching of humanities and of social sciences is regarded by some as liberal education; others plead for their inclusion on the ground that they are vocationally relevant. There is a third set of people who combine the two views: they say that social sciences contribute to professional training and while doing so, they add to the liberal education of the trainee.

To ascertain the views on this subject, we addressed the following question: "How would you describe the present role of social sciences in an institution such as yours? Would you say that social science teaching is: a part of liberal education only? helpful in professional training? meant to serve both the purposes? any other?"

The responses received are presented in Table 18.

The analysis of responses clearly indicates that the majority of social science teachers regard this training as part of the professional kitbag. A meagre 5.9 per cent have assigned it only the "liberalizing" role. There is a higher percentage (11.94) of such persons in the engineering institutions. In the medical institutions, social sciences appear to be completely internalized, with a small 1.63 per cent regarding them only as part of liberal education.

This, however, does not deny the liberalizing role of social sciences. There is a significantly high percentage of teachers who

Table 18. Percentage distribution of social scientists by their definition of the purpose of social science teaching

At present social science teaching is	Institution			Total
	Agricultural	Engineering	Medical	
A part of liberal education only	6.60	11.94	1.63	5.90
Helpful in professional training	44.70	29.85	45.90	42.48
Meant to serve both purposes	41.60	52.23	38.52	42.48
Other	1.01	2.98	0.81	1.29
No response	6.09	2.98	13.11	7.77

have talked of the twin roles. Regrouping the data in terms of the votaries of the two, we get the pattern as shown in Table 19.

Table 19. Percentage distribution of respondents by their emphasis of aims of social science education

Those who mentioned	Institution			Total
	Agricultural	Engineering	Medical	
Liberal education function	48.20	64.17	40.15	40.38
Professional training function	86.30	82.08	84.42	84.56

The percentage distribution in Table 19 is clearly indicative of the degree of internalization of social sciences in the teaching curricula of the three sets of institutions. This is also associated with the recruitment pattern: only 11.94 per cent of the social science teachers in engineering institutions have an engineering background, whereas the percentage of social science teachers who have a "technical degree" in agricultural and medical institutions are 79.19 and 58.20 respectively.

Social science teacher's role-set

The performance of an occupant of a status depends upon the demands made by the members of his "role-set". We, therefore, sought to know the attitude of the occupants of key counter-statuses of the social science teacher in the technical institutions.

The three important members of his role-set are the students, the teachers in other departments, and the administrators.

The respondents were asked to report their experiences with these members of their "role-set", that is, to state whether they found their attitude hostile, hospitable or neutral.

Attitude of teacher-colleagues from other faculties: Social science teachers were of the view that in general the attitude of the colleagues from other faculties was neutral (49.74%) (Table 21). However, 26.42 per cent felt that their colleagues were quite hospitable and 19.43 per cent described them as hostile. The attitude of indifference is predominant in all the three sets of institutions, the highest being in the engineering institutions (61.19%). In the remaining two sets of institutions this percentage is much lower – 47.21 per cent in agricultural institutions and 47.54 per cent in medical institutions.

Hostility was experienced by 24.37 per cent of the respondents from the agricultural institutions while in the other two sets of institutions less than 15 per cent reported such an experience. Socialscientists in medical institutions appear to be better placed as 32 per cent of them say that their colleagues are hospitable to them. This is understandable as most of the respondents from these institutions are basically doctors holding the same degree as their colleagues.

Attitudes of administrators: A similar pattern is noticeable in the case of administrators: 50.52 per cent of the teachers felt that the administrators were indifferent, 31.87 per cent regarded them as hospitable, and 14.77 per cent felt that they were hostile. Perception of hostility is highest in agricultural institutions (18.78%) and lowest in the engineering institutions (5.97%). In medical institutions 13.11 per cent complained that the attitude of the administrators was hostile towards them.

Attitudes of the students: In contrast with the attitude of colleagues and the administrators, the attitude of the students towards

social sciences and towards those teaching social sciences is more favourable. Among the respondents, 48.45 per cent said that their students welcomed the introduction of social sciences. Though 41.45 per cent said that students were indifferent, only 5.96 per cent felt that their students resented the inclusion of social sciences. The majority of respondents from agricultural institutions (55.33%) said that the attitude of the students was "hospitable", while for medical and engineering institutions the highest percentages said the attitude was "indifferent" (45.90 and 46.27 respectively). Hostility was felt most by teachers from medical institutions (9.87%) compared to those from engineering institutions (5.97%) and agricultural institutions (3.55%). All these three frequencies are, however, considerably lower than the frequencies for hostility experienced from colleagues and administrators.

It was reported by teachers from agricultural and medical institutions that the resentful attitude towards social sciences is most expressed by newly admitted students in the undergraduate courses. They felt that over the years the attitude becomes more and more favourable. However, teachers in the engineering institutions felt that there was no remarkable rise in hospitality as one moves from undergraduate to post-graduate level.

The hospitality figures for the undergraduate and the graduate students in the three sets of institutions are given in Table 20.

Table 20. Percentage distribution of students: hospitality figures

Students expressing hospitality	Institution			Total
	Agricul- tural	Engi- neering	Medical	
Undergraduate stu- dents: first and second year	29.95	37.31	17.21	27.20
Undergraduate stu- dents: third and fourth year	50.25	35.82	27.87	40.67
Post-graduate students	63.96	34.33	38.52	50.78

Comparisons within institutions: We may now compare the attitude profiles of the respondents' role-set members in each of the three sets of institutions.

An inspection of Table 21 shows that in all the three sets of institutions the attitude of teachers from other faculties can be described as more hostile than that of the administrators and the students. If we combine the categories of "hostile" and "indifferent", most of the teachers fall into the joint category. The administrators are largely indifferent, whereas students are judged to be responsive and hospitable.

Table 21. Respondents' impression of the attitude of others towards social sciences

	Teachers	Administrators	Students
<i>Agricultural institutions</i>			
Hostile	48(24.37)	37(18.78)	7(3.55)
Indifferent	93(47.21)	100(50.76)	73(37.06)
Hospitable	51(25.89)	57(28.93)	109(55.33)
Other	5(2.54)	3(1.52)	8(4.06)
<i>Engineering institutions</i>			
Hostile	9(13.43)	4(5.97)	4(5.97)
Indifferent	41(61.19)	36(53.73)	31(46.27)
Hospitable	12(17.91)	23(34.33)	30(44.78)
Other	5(7.46)	4(5.97)	2(2.98)
<i>Medical institutions</i>			
Hostile	18(14.75)	16(13.11)	12(9.84)
Indifferent	58(47.54)	59(48.36)	56(45.90)
Hospitable	39(31.97)	43(35.25)	48(39.34)
Other	7(5.74)	4(3.28)	6(6.92)
<i>Total</i>			
Hostile	75(19.43)	57(14.77)	23(5.96)
Indifferent	192(49.74)	195(50.52)	160(41.45)
Hospitable	102(26.42)	123(31.87)	187(48.45)
Other	17(4.40)	11(2.85)	16(4.14)

(Figures in parentheses indicate percentage by columns.)

Change in attitude over the years: As a supplementary to the question on the attitude of teachers, administrators, and students

towards the inclusion of social sciences in the courses taught in the institution of the respondent, we asked another question: "Over the years, has there been any change in the attitude of teachers, administrators and students towards social sciences?" The respondents were asked to specify whether the attitude "is same", "has become favourable", "has become indifferent", or "has become hostile". The purpose of the question was to find out whether the present appraisal given by the respondents was any different from what it has been in the past. In other words, had the acceptability of the social sciences increased or decreased over the years?

Table 22. Scores of acceptability index

Attitude towards social science	Institution				Total
	Agricul- tural	Engi- neering	Medical		
Hospitable	+1	45(22.84)	13(19.40)	21(17.21)	79(20.47)
Neutral	—0	126(63.96)	48(71.64)	63(51.64)	237(61.40)
Hostile	—1	10 (5.08)	3 (4.48)	9 (7.37)	22 (5.70)
NR		16 (8.12)	3 (4.48)	29(23.77)	48(12.44)
Total		197(100.00)	67(100.00)	122(99.99)	386(100.01)
Mean score	+0.19	+0.156	+0.129	+0.168	

It was the general feeling in the group that the attitudes of the members of the role-set had become more favourable. This may be said of all the three categories: 55.44 per cent said it was so for teachers, 49.49 per cent said so for administrators, and 53.10 per cent said so for students.

A very small percentage of respondents felt that the teachers (3.37), or the administrators (2.85), or the students (1.04) had become hostile. No change in the situation was reported by 24.09 per cent respondents for teachers, by 28.49 per cent for administrators and 23.06 per cent for students. (Table not given)

Acceptability Index

The responses to the questions on the acceptability of social sciences in professional institutions were consolidated to form a *scale of acceptability*. The items included in the scale and the scores given to the responses are indicated in Table 23.

Table 23. Acceptability index: items and scores

Question	Response	Score
1. What position do you think social sciences occupy in the curriculum of your institution, at the undergraduate level?	Very important place	+1
	Important place	0
	Nominal place	-1
2. How do you view the present allocation of marks to social sciences in the under-graduate courses?	Satisfactory	+1
	Not very satisfactory	0
	Unsatisfactory	-1
3. How do you find the attitude of teachers of other departments towards inclusion of social science courses in your institution?	Hospitable	+1
	Neutral	0
	Hostile	-1
4. Attitude of administrators?	Hospitable	+1
	Neutral	0
	Hostile	-1
5. Attitude of students?	Welcome	+1
	Show indifference	0
	Resent being taught social sciences	-1
Score range	Description	Reassigned score
+3 to +5	High=Hospitable	+1
-2 to +2	Medium=Neutral	0
-3 to -5	Low=Hostile	-1

The respondents' judgement regarding the acceptability of social sciences in technical institutions, based on the above scale, is analysed in Table 22.

It is clear from Table 22 that social science teachers operate in a somewhat indifferent milieu. Such a situation can be challenging for some and distressing for others. Their participation is expected to depend upon their assessment of the situation and their orientation towards it.

Identification with the institution

We asked the respondents to compare their position with the university teachers (that is, those teaching in what may be called "conventional" social science departments) as well as with their colleagues in other "technical" departments. Questions were also asked about their future in the institution as seen by them, as well as about their plans. Lastly, they were asked to give an overall assessment of their involvement in the institution. Responses to these questions have been analysed below and an overall *contentment index* has been constructed.

Comparison with their colleagues in the university departments: The question asked was: "How do you compare your position here with that of teachers in similar positions in the university?"

In response to this question only 26.42 per cent of the teachers said that they were wrongly placed; 47.41 per cent felt that there was no difference between the two places; 19.43 per cent found themselves better placed. The pattern seems to be similar in all the three sets of institutions.

Table 24. Comparison with colleagues from other university departments

Comparison with university teachers	Institution			Total
	Agricultural	Engineering	Medical	
Better placed here	34 (17.25)	14 (20.90)	27 (22.13)	75 (19.43)
Similar/no difference	109 (55.33)	26 (39.80)	48 (39.34)	183 (47.41)
Wrongly placed	48 (24.37)	23 (34.33)	31 (25.41)	102 (26.42)
Not applicable	4 (2.03)	3 (4.48)	5 (4.10)	12 (3.11)
No response	2 (1.02)	1 (1.49)	11 (9.02)	14 (3.63)
Total	197 (100.00)	67 (100.00)	122 (100.00)	386 (100.00)

Comparison with their colleagues in other departments: Social science teachers, in general have asserted that they do not suffer from inferiority complex. Compared to the colleagues of equal rank and status in the institutions where they work 69.43 per cent of the social science faculty placed themselves, in a similar position. Only 15.54 per cent said that they were in a lower position, and 11.14 per cent described their position as higher. The largest percentage of teachers who felt their position was lower, came from medical institutions (26.23 %), followed by the teachers in the engineering institutions (17.91 %) and agricultural institutions (8.12%)

Table 25. Comparison with colleagues in other departments

Comparison with other colleagues	Institution			Total
	Agricultural	Engineering	Medical	
Higher	23(11.67)	6(8.96)	14(11.48)	43(11.14)
Similar	157(79.70)	43(64.17)	68(55.74)	268(69.43)
Lower	16 (8.12)	12(17.91)	32(26.23)	60(15.54)
Other	—	4 (5.97)	1 (0.81)	5 (1.30)
No response	1 (0.51)	—	—	1 (0.26)
	—	—	7 (5.74)	7 (1.81)
Cannot be compared	—	2 (2.99)	—	2 (0.52)
Total	197 (100.00)	67 (100.00)	122 (100.00)	386 (100.00)

Involvement in the institutions: To get a consolidated view on the social scientists involvement in the work of the institution, the following question was asked: "How deeply involved do you feel you are in the affairs of the institution?"

Only 7.51 per cent (29) confessed that they were not at all involved. Those who said that they were "deeply involved" constitute 48.70 per cent. Both in agricultural and in medical institutions, the highest frequency lay in this category of response. In the engineering institutions, however, the number of people who said that they were "somewhat involved" was larger (52.24%). It also appears that age and involvement are positively related. Senior people, older in age, are more deeply involved than the junior and younger ones.

Table 26. Involvement in the institution

Extent of involvement	Institution			Total
	Agricul- tural	Engi- neering	Medical	
Deeply involved	95(48.22)	29(43.28)	64(52.45)	188(48.70)
Somewhat involved	83(42.13)	36(52.24)	46(37.70)	164(42.49)
Not at all involved	17 (8.63)	2 (2.99)	10 (8.20)	29 (7.51)
Other	—	—	1 (1.49)	1 (6.26)
No response	2 (1.02)	2 (1.65)	—	4 (1.04)
Total	197 (100.00)	67 (100.00)	122 (100.00)	386 (100.00)

Effect of employment in technical institutions on social science career: The respondents were asked an opinion-oriented question to find out whether they thought that working in technical institutions would adversely affect their own career in social sciences. Their responses are given in Table 27.

Table 27. Perception of prospects

Question : Would you agree that the longer you work here, the further you will be from the main stream of professional life as a social scientist?	Institution			Total
	Agricul- tural	Engi- neering	Medical	
I fully agree	32 (16.29)	9 (13.43)	19 (15.57)	60 (15.54)
I agree	30 (15.22)	19 (28.35)	11 (9.01)	60 (15.54)
It is difficult to say	59 (29.94)	14 (20.89)	36 (29.51)	109 (28.24)
I disagree	55 (27.91)	15 (22.38)	29 (23.77)	99 (25.64)
I do not agree at all	21 (10.65)	9 (13.43)	15 (12.30)	45 (11.65)
Other responses	—	1 (1.49)	12 (9.84)	13 (3.36)
Total	197 (100.01)	67 (99.97)	122 (100.00)	386 (99.98)

The responses indicate that 31 per cent of the teachers in all the institutions taken together agreed with the view that they would be outside the mainstream of social science if they continued to work in the institution. This feeling was the highest among the teachers working in the engineering institutions (41.78%) followed by those in agricultural institutions (31.46%) and in medical institutions (5.57%). Ambivalence on this issue was found in 28.23 per cent of the respondents – the percentage for agricultural and medical institutions corresponds to this figure: 29.94 and 29.57 per cent respectively. The response pattern indicates that greater adjustment has been attained in agricultural and medical institutions. This is understandable in view of the fact that social sciences in these institutions are taught mostly by those who possess professional degrees.

Table 28. Plans for the future

Plan	Institution			Total
	Agricul- tural	Engi- neering	Medical	
I plan to quit as soon as possible	10(5.08)	8(11.94)	8(6.56)	26(6.74)
I plan to work for a while then quit	21(10.66)	8(11.94)	11(9.02)	40(10.36)
I will work here for some years then quit	28(14.20)	7(10.45)	9(7.38)	44(11.40)
I expect to be working here for many years, but will change to another place if I have the chance	90(45.69)	18(26.86)	40(32.79)	148(38.34)
I expect to be working for many years probably here	47(23.86)	26(38.81)	46(37.70)	119(30.83)
Other	—	—	1 (0.81)	1 (0.26)
No response	1 (0.51)	—	7 (6.55)	8 (2.33)
Total	197 (100.00)	67 (100.00)	122 (100.00)	386 (100.00)

Plans for the future: We asked the respondents to tell us about their future plans. A total of 66 teachers (17.10%) wanted to quit the institution, either soon or after some time. To this number may be added 44 (11.40%) others who said that they would like to leave the institution after working for some years. About 148 (38%) said that they would change if they got the chance, otherwise they would continue working in the institution. Those who were happy with their present job constituted 30.83 per cent.

The data reveal that teachers in engineering institutions are less contented than those from the other two professional institutions. Table 28 gives the details.

Contentment Index: Based on the five questions analysed in Table 28, we have tried to construct an *index of contentment*. Responses to each of these questions were trichotomized: those which expressed contentment were given +1; those showing frustration were assigned -1; an indifferent attitude was given the score of zero. The weightage given to the different responses is shown in Table 29.

The respondents are distributed on this index as shown in Table 30.

The respondents appear to be highly ambivalent with regard to their identification with the institutions where they work: 79 per cent of the social science teachers from agricultural institutions, 62.69 per cent of the engineering teachers, and 62.30 per cent of the medical teachers are ambivalent. The contentment index is low for all the three groups. The least contented are the teachers from the agricultural institutions; only 12.18 per cent fall in the "contented" category. The medical sample comes close to this with 13.11 per cent. As against these figures, the teachers in engineering institutions stating that they are contented constitute 19.40 per cent.

These figures are indeed striking. Despite the fact that social science departments in agricultural and medical institutions are mostly manned by those who possess technical degrees and, therefore, can perhaps talk on the same "wavelength" with their colleagues, a smaller per cent of them are contented as compared to teachers in the engineering institutions.

Table 29. Contentment index: items and scores

Item		Weight
1. How do you compare your position here with that of teachers in a similar position in the University? Would you say you are:		
	Better placed here	+1
	Similar/no difference	0
	Wrongly placed	-1
2. Compared to teachers of your rank in other departments in your own institution, how would you place yourself?		
	Higher	+1
	Similar/no difference	0
	Lower	-1
3. How deeply involved do you feel you are in the affairs of your institution? Would you say you are:		
	Deeply involved	+1
	Somewhat involved	0
	Not at all involved	+1
4. Would you say that the longer you work here the farther you will be from the mainstream of the professional life as a social scientist?		
	I disagree	+1
	I do not agree at all	+1
	It is difficult to say	0
	I agree	-1
	I fully agree	-1
5. What are your own plans for the future?		
	I expect to be working for many years, probably here	+1
	I plan to work for a while then quit	0
	I will work here for some years, then quit	0
	I expect to be working for many years, but will change to another place if I have the chance	0
	I plan to quit as soon as possible	-1
Score range		Reassigned score
+3 to +5	Contented	+1
+2 to -2	Ambivalent	0
-3 to -5	Frustrated	-1

Table 30. Score on contentment index

Contentment dimension	Wt.	Institution			Total
		Agricultural	Engineering	Medical	
Contented	+1	24(12.18)	13(19.40)	16(13.11)	53(13.73)
Ambivalent	0	156(79.19)	42(62.69)	76(62.30)	274(70.98)
Frustrated	-1	10 (5.08)	7(10.45)	7 (5.74)	24 (6.22)
No response		7 (3.55)	5 (7.46)	23(18.85)	35 (9.07)
Total		197(100.00)	67(100.00)	122(100.00)	386(100.00)
Mean Score		+ .07	+ .09	+ .09	+ .082

IV. Summary

Social sciences are represented in 37.48 per cent of the institutions engaged in preparing the future generation of agricultural scientists, engineers, and doctors. In the 151 institutions where social sciences are taught, there is a total of 738 social scientists – some having their basic degree in social sciences and others in professional courses with a heavy dose of social science. Social sciences that have gained entry into the professional courses are economics, psychology, sociology and social anthropology, social work, political science, education, and commerce. In the fields of agriculture and engineering, economics has received the highest recognition: 42 per cent of the teachers in engineering institutions have specialised in economics. To this number 9 per cent of teachers having their degrees in commerce may also be added. In agricultural institutions, persons belonging to the twin disciplines of economics and commerce constitute about 11 per cent. The high percentage of social scientists in the engineering institutions is due to the fact that very few persons in the faculty of social sciences have their basic degrees in engineering. In agricultural institutions, extension people teach social science subjects; in medical institutions the teachers in preventive and social medicine share the teaching load relative to social sciences.

From the survey, it emerges that only 35 per cent of the teachers in the social science faculties have their M.A. degrees in social science disciplines. These may be called “strangers” or “new men” in the setting of a professional institution.

The summary of the status of social sciences in the three sets of institutions – agricultural, engineering, and medical – as perceived by the social science faculty may now be presented.

Social scientists in agricultural institutions

In 53 of the 110 institutions engaged in teaching agricultural sciences, a place has been accorded to social sciences. In these institutions – which are 48 per cent of the total, as many as 331 teachers work in the faculties of social sciences, making an average of 6.24 persons per department. The departments

are heterogeneous in that there are people having their basic degrees in social sciences as well as in other disciplines. Only 20.8 per cent (economists 9.6 per cent, sociologists 5.58 per cent, psychologists 2.54 per cent, and others) belong to social sciences; the rest have degrees in agricultural extension, agriculture, veterinary science, and other related fields.

The faculty is young, with 52 per cent of the respondents falling in the age group 26–35. Only 24 per cent of the teachers have gone abroad either for studies or for short trips.

While the teaching load is quite favourable (9.5 hours per week on an average), the social science faculty has not shown much interest in the pursuit of research; 44 per cent of the teachers do not have a single research paper to their credit. They are, however, required to allot a portion of their time to extra-academic activities of the institution. About 63 per cent of the respondents have such engagements.

Social science teachers in agricultural institutions feel that a reasonable status has been assigned to social sciences; only 34 per cent are of the view that they are accorded only a “nominal” place. Satisfaction over the allotment of marks for the social science courses was expressed by 53 per cent of the respondents.

Based on the perception of the social science faculty, it can be said that there is considerable indifference among the administrators and the teacher colleagues from the other departments towards inclusion of social sciences in the curricula for agricultural graduates. It is, however, heartening to learn that 55 per cent of the teachers regard the attitude of the students as hospitable. On an acceptability index (range being +1 to -1), the social science status in agricultural institutions is +0.19 which is denotative of indifference. This must be the reason why 31.5 per cent people said that the longer they stayed there, the farther they would be from the mainstream of the profession of social sciences. Their contentment index was also quite low: +.07 on a scale, ranging from +1 to -1.

Social scientists in engineering institutions

Social sciences are taught in 45 of the 130 institutions

(34.61 %) of engineering education that we contacted. In these institutions a total of 138 social science teachers are employed. However, only 48.5 per cent (67) of them responded to our questionnaire.

The size of the social science faculty in these institutions is quite small, the average being 3.02. However, those possessing basic degrees in social sciences constitute 88 per cent. Social sciences represented include: economics (41.7 %), psychology (14.93 %), political science (10.45 %), commerce (8.96 %) and sociology (1.49 %).

A large number belong to the younger age group – 50 per cent are in the age group 26–35. Only 31 per cent of the respondents from Engineering institutions had gone abroad. As many as 46 per cent have no research publications to their credit; 58 per cent of them have worked at more places than one.

The teaching load is not heavy – only to 10.56 hours per week. But 70 per cent of the teachers have extra-academic responsibilities.

The majority of the social scientists working in engineering institutions (56.71 %) feel that the social sciences have only a nominal place in the curricula. However, 52.24 per cent regard the allotment of marks as satisfactory.

The respondents largely found an attitude of indifference among all the members of their role-set (teachers in other departments, students, and administrators); 44.8 per cent of them felt that their students were hospitable. The overall acceptability index is +0.15. In such a milieu, it is natural that 41.78 per cent expressed the fear that they would become alienated from their professional community if they stayed too long in engineering institutions. Their score on the contentment index was as low as +.09.

Social scientists in medical institutions

Only one-third of the medical institutions have reported that they have social sciences. This appears to be a conscious understatement. It is common knowledge that preventive and social medicine is a compulsory subject and, therefore, the social sciences component is universal in medical education in

India. However, teachers with their medical degrees might have decided to refrain from asserting their social scientist status. The data analysed here relate only to those who defined themselves as social scientists. Of the total of 269 scholars approached by us in these 53 institutions, 122 (45.35%) responded. The average size of the departments is 5.05. In this sample, 51.64 per cent have their degrees in P.S.M. In addition, there are psychologists (12.30%), social work people (8.20%), sociologists and anthropologists (6.56%), and others.

The number of people who have gone abroad is 44 (36.06%).

The faculty is young in these institutions also: 44.26 per cent were in the age group 26-35, and 31.96 per cent in the age group 36-45. These teachers have a very light teaching load (7.27 hours per week) and considerable free time. Only half of them have any other extra-academic responsibilities. Despite this, research output is strikingly low; 57 per cent have not written any research papers.

Among the respondents, 17.21 per cent feel that social sciences are given a "very important place" in the syllabus; 40.16 per cent think that they are given an "important place", and 31.14 per cent consider that they are just "nominal". Only 27 per cent of them regard the present allotment of marks as satisfactory.

An attitude of indifference regarding the acceptability of social sciences prevails in the medical institutions. The acceptability index is $+ .13$. While the contentment index is as low as $+ .09$, only 14.58 per cent expressed the fear that they would get alienated from their professional community.

Final comment

From the foregoing analysis, it emerges that social sciences are taught in nearly half of the agricultural institutions and in one-third of the engineering and medical institutions. The teachers participating in the programme of social science education in these institutions feel that social sciences are given a fairly important place in agricultural and medical education (63.95 per cent and 57.37 per cent respectively), but in engineering education they are still nominal.

The discipline of economics occupies an important place in

agricultural and engineering institutions, in medical institutions it is psychology, followed by sociology and social work.

The majority of the respondents have expressed the view that social sciences taught to the professional trainees should be such that they contribute to their professional kit-bag. It is the general feeling that social sciences cannot be just a part of liberal education. They will be more acceptable when they are vocationally relevant. Such an exposure will have a liberalizing effect as well.

The social science movement in technical education is a relatively recent phenomenon. Those who have accepted the challenge and joined the faculties of these institutions are largely young and trained in conventional disciplinary courses. Faced with the crisis of a lower degree of acceptability, their contentment is low, and their orientation is ambivalent. A very small number among the social science teachers possess a research degree, and the overall research output has been meagre. The setting provides them, however, with ample free time and challenge to justify their existence. These areas – medicine, agriculture, and engineering – are also relatively unexplored territories. Utilizing the available manpower for research into these areas will generate new information needed for making courses more vocationally relevant and will provide avenues for a meaningful dialogue between social scientists and the professional men.

Social sciences have arrived in the professional institutions, but they have yet to make their presence felt.

SOCIAL SCIENCES IN THE EDUCATION FOR PROFESSIONS: ANALYSIS OF SYLLABI

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THE SOCIAL SCIENCE needs of institutions engaged in professional education can be ascertained from the syllabi they follow. A syllabus can be regarded as an index of acceptability of certain topics in terms of their utility. It might also serve to define the scope of a given discipline in the context of an overall programme of training. At times, the syllabus may also reflect the stage of the development of the discipline or the quality of the people teaching the course.

Social sciences are relatively new in professional education. The syllabi introduced, therefore, indicate the general areas of acceptability in the topics that have been introduced for teaching. An analysis of the syllabi will help in identifying the themes and areas in which social science expertise is needed. The future generations of social scientists who opt for a teaching career in the professional institutions can then be trained in those fields. New researches can also be generated in them.

With this object in view, we had written to different institutions and universities asking them to send their social science syllabi. The number of institutions to whom this request was made and the responses received are given in Table 1.

Table 1 shows that the response rate was very poor. In all, 23 per cent of the institutions responded. The highest percentage was among agricultural institutions, followed by engineering and medical institutions respectively.

Besides this poor response, there were other problems which

Table 1. Response rate

Professional institutions	Request sent	Response received	% of responses
Agriculture	73	19	26.02
Engineering	130	31	23.80
Medicine	95	19	20.00
All institutions	298	69	23.15

made it difficult to assess the status of social sciences in professional education. Some of the problems are listed below:

1. All the institutions did not send their detailed syllabi. It became difficult to find out – especially in medicine – whether the social sciences taught formed part of the paper titled *Social and Preventive Medicine* or whether social sciences were taught as a separate paper.

2. Most institutions did not specify the stage of training at which the students were exposed to social science courses.

3. The number of hours per week allotted for the courses were not specified.

4. The institutions did not specify the marks allotted to social sciences, nor the weight given to them in the final evaluation of the students.

In the pages that follow we present the details of various social sciences covered in different disciplines.

1. Social sciences in agricultural institutions

The number of institutions/universities which responded to our request for syllabi was 19. Of these, one did not send the detailed course, and another did not send the undergraduate syllabus. Thus, this analysis refers to 17 institutions. The different sets of social science courses taught in these institutions are given below:

Economics and Extension Education	7
Economics, Sociology and Extension Education	4
Economics and Sociology	2

Economics, Psychology, Sociology, and Extension Education	2
Economics, Sociology, and Psychology	1
Economics	1

The above distribution of courses shows that economics is taught in all the institutions. As in engineering institutions, economics forms one of the compulsory subjects in agricultural institutions. Extension education occupies second place, with 13 institutions teaching this course. Sociology comes third with nine institutions offering it. Only three institutions expose their students to the discipline of psychology. A detailed analysis of the various topics of each of the social sciences taught in agricultural institutions is given below:

Economics

The syllabus for economics can be divided into five main sections:

(a) Basic concepts, (b) Agricultural economics, (c) Economics of production, (d) Farm management, and (e) Marketing. The aspects covered under each of these are as follows:

(a) *Basic concepts*: Definition and scope, its relation with other social sciences, economics of home management, stages of economic growth, capital, wages, credit, money, value, rent, price, interest, public finance, banking, taxation, distribution, consumption, demand and supply, labour and wants, foreign exchange, and international trade.

(b) *Agricultural economics*: Planning of activity, state and agriculture, agricultural co-operation, agricultural capital, agricultural finance, agricultural credit, agricultural labour, agricultural problems of India, problems of land, population growth and density, agricultural prices, food problem, irrigation, land tenures, and land taxation.

(c) *Economics of production*: Nature of production, factors of production, principles of localization of industries, laws of production, types of productive organization, role of the state in the development of Indian industry, production function, stages of production, and resource allocation,

(d) *Farm management*: Scope and principles of farm

management, characteristics of farm management, steps in farm planning, farm business, farm appraisal, functions of farm management, factors affecting farm progress, system of farming and types of farming, choice of crops and livestock, farm profit, farm planning and budgeting, and farm accounting.

(e) *Marketing*: Definition and scope of agricultural marketing, role of government in the improvement of agricultural marketing, conditions of wide market, marketing functions, marketing cost, defects in marketing, general and agricultural marketing, classification and types of market, marketing agencies, problems in marketing, marketing legislation, the concept of equilibrium, and competitive market.

Extension education

(a) *Concepts*: Meaning, scope and importance of extension education, history and development, rural youth movements in India and abroad, role and quality of extension workers, extension teaching methods, teaching aids for extension work, meaning, nature and importance of communication, programme planning and evaluation.

(b) *Rural society*: Structure of Indian rural society, concept of community, life, characteristics of rural society and religion, family life in India, caste system, customs, folkways and mores, types and classification of villages, play group, neighbourhood, social institutions, social stratification and social change, factors of social change, rural leadership, community development and panchayati raj, five year plans, village organization, administration, sampling, organization of crop campaign, programmes of extension, contacting the farmers, agriculture department and its functions, organization and staff.

Sociology

(a) *Concepts*: Definition and scope of sociology, its relation with other social sciences, characteristics and functions of society, groups, associations and institutions, culture, civilization, personality, social change, cooperation, competition and conflict, accommodation and assimilation, social disorganization, juvenile delinquency, crime, beggary and poverty, meaning,

nature and elements of social system, mechanism of social control, social stratification, social mobility, family, marriage, state and local-self government, heredity, and environment.

(b) *Rural sociology*: Definition and scope, importance of rural sociology in extension education, characteristics of rural society, rural and urban differences, rural health, family planning and applied nutrition, impact of urbanization, technology, basic principles of community organization, various aspects of rural family, role of various social, economic, political, educational and other institutions of rural society in India, objectives and methods of community development, panchayati raj, rural leadership, social welfare and welfare organization, and tribal society.

Psychology

Definition, methods and fields of psychology, basic concepts of behaviour – instincts, drives, attitudes, socialization, interests, sentiments, heredity and environment, learning, intelligence and creativity measurement and development of personality, emotions, perception, meaning and scope of educational psychology.

2. Social sciences in engineering institutions

Content analysis in this discipline is based on the syllabi supplied by 31 universities and institutions. This includes five institutions which offer one course in social sciences. Four institutions in the list have courses in architecture, and four others offer degrees in chemical engineering. The various sets of social science courses taught in these institutions are listed below:

Economics and Management	9
Economics, Politics, and Management	2
Economics, Political Science, Sociology, and Management	2
Economics, Psychology, and Management	2
Economics	2
Economics, Management, and Humanities	1

Economics, and Humanities	1
Economics, Management, Sociology, and History of Culture	1
Economics, Sociology, Civics, and History of Culture	1
Economics, Political Science, Sociology, and Human Relations in Industry	1
Economics, Political Science, Psychology, and Modern History	1
Economics, Political Science, Psychology, and Sociology	1
Economics, Management, Psychology, and Sociology	1
Economics, Philosophy, Psychology, and Sociology	1
Economics and Philosophy	1
Social Sciences	1
Humanities	1
Civics	1

A scanning of the various sets of social science courses taught in engineering institutions shows that except for one institution, all the institutions which offer degrees in civil, electrical, mechanical, and chemical engineering teach economics. Thus, it is evident that economics has acquired an important place in engineering education. In all, 27 institutions/universities teach economics. The institutions which offer courses only in architecture do not offer economics. Management studies have occupied the second position in 18 universities offering this course. Only nine institutions including architecture colleges expose their students to the discipline of sociology. Sociology also includes topics covered under history of culture. Political science is taught in seven institutions. To this are to be added three architecture colleges which teach this subject under "civics". There are four institutions which teach social sciences under either humanities (3) or social sciences (1). The subject-matter of these papers have not been analysed separately.

It may be mentioned that some of the courses are especially meant for a specific branch of engineering. For instance, the courses in the history of culture and civics are meant only for the students of architecture. Since most of the institutions did not specify the social science content, no separate analysis is attempted. In the institutions that specified the branches, there was overlap of contents. The contents of various social

sciences taught to engineering students are given below:

Economics

As mentioned earlier, economics has an important place in engineering education. As many as 27 institutions teach economics. Of these, 17 institutions offer only one course, 6 offer 2 courses, and 4 offer 3 courses. The details of the topics covered in the engineering colleges are presented below:

(a) *Introductory economics*: Nature and scope of economics, economics and technology, principles of economic theory as applied to production, capitalism, socialism, mixed economy theory, communistic economic system.

(b) *Capital*: Fixed, circulating, non-specialized and sunk, nature and function of capital in modern industry and commerce, different methods of financing firms and projects, demand and supply of capital, and market for capital.

(c) *Cost*: Definition, object and functions. Classification of cost – fixed and variable costs, real and opportunity costs, methods of allocation of overhead costs and element of costs, average and marginal cost, problems in distributing and allocating overhead cost, index number, law of comparative cost, purchasing, storing, and ascertaining correct cost of material.

(d) *Prices*: Role of prices in economy, theory of price, monopoly price, market price and normal price, balance of trade and level of prices, pricing of commodities and market conditions, change of price overturn, demand and supply, competition and monopoly, public policy to stabilize prices of material and inventory, wastage of spoilage of scrap and by-products.

(e) *Labour*: Productive – unproductive, intellectual and physical efficiency of labour, mobility of labour and division of labour, labour laws, labour conditions of work, labour problems, labour payment, industrial labour, trade union, causes and settlement of industrial disputes and labour welfare, effects of introduction of machinery.

(f) *Exchange*: Meaning and theory of exchange, barter system, stock exchange and instruments of exchange, exchange rate, different types of market.

(g) *Money*: Definition and functions of money, Gresham's law, value of money, main constituents of Indian money market, inflation, deflation and their effect on production and employment, public debt, deficit financing, and foreign capital.

(h) *Taxation*: Cannons of taxation, direct and indirect, characteristics of a good tax system.

(i) *Growth*: Various aspects of growth, various models of growth, different theories of growth, problems of underdeveloped areas, input and output model of a closed economy in steady growth.

(j) *National income*: Computation and distribution of national income by goods flow and earning flow methods, difficulties in the calculation of national income in India.

(k) *Interest and profit*: Distinction between interest and profit, theories of interest, interest on capital and drawings.

(l) *Trade*: Home trade and foreign trade, features of international trade, state trading, India's foreign exchange crisis, problems of international equilibrium.

(m) *Production*: Meaning and factors affecting production, standardization and large-scale production, chief characteristics of modern system of production, specialization, use of machinery, causes of the existence of small-scale production and localization of industries, theory of production, increasing and diminishing returns, forms of organization, the linear homogeneous function, Cobb-Douglas production function. Equilibrium of a firm, the product engineer and the production function, sales manager, the best level of output and linear quadratic and envelope cost.

(n) *Modern industry*: Features of modern industrialism, different forms of business organization, size and location of industrial unit, aspects of industrial administration, business administration, economic aspect of industries, industrial promotion, and structure of growth of Indian industries.

(o) *Planning*: General theory of economic planning, planned economy and techniques of planning for a country based on the economic and social background, meaning of economic development, planning in India, five year plans, and problems of Indian planning.

(p) *Resources*: Economic resources of India including

natural resources, human resources, and world resources; Indian agriculture, its background and development; national and private wealth, human wants, utility, value, rent, law of scarcity, book-keeping and accounts, distribution, different aspects of wages, depreciation, advantages and limitations of free enterprise system, necessity and forms of state intervention, nationalization, and employment exchange.

Management

Only 18 institutions teach management to their students. Of these 11 teach one paper, 6 teach 2 papers, and 1 teaches 3 papers. Most of the institutions teaching one paper in management offer it to the students of mechanical and electrical engineering. Generally this paper is taught either at the fourth or the fifth year level.

The topics covered under management are listed below:

Development of scientific management and its types, rationalization and scientific management, goals, objectives, and functions of management, various aspects of personnel management such as selection, placement, and technical and non-technical personnel, division and specialization of labour welfare activities, working conditions, accidents and safety protection, social security, discipline and grievances, causes of industrial unrest, change in work assignment and hours of work, promotion, transfer, demotion and discharge, techniques of executive control, labour unions and their objectives.

Types of organization, their merits and demerits, essentials of a good organization, organization charts, organization policies, factors in planning organization, modern tendencies in factory organization, approaches to organizational analysis.

Materials management – organization of stores, purchase, and sales. Location and layout.

Productivity-meaning and measurement, effects of design on cost, factors affecting design, importance of standardization, simplification and interchangeability of parts.

Research organization and procedure and initiation of the projects, evaluation of projects, and report writing, patent rights, protection, and trade-mark.

Considerations in product development, cost of development,

organization of the research department and selection and control of research personnel.

Need for planning, organization of the production unit, control procedure, motion and time study, quality control and inspection, human relations in industry, industrial psychology, advantages and disadvantages of automation, leadership and supervisory behaviour, wages and incentives, industrial law, business statistics, index numbers, charting trend curves, ratios, trend indices, budgeting and statistical methods in industry, various aspects of valuation, accounts and book-keeping, market analysis and sales function, and industrial economics.

Sociology

Nine institutions offer courses in sociology. In 3 institutions this course is taught to students of all branches, 2 institutions did not specify the branches to which this course is offered, and the remaining 4 institutions teach this subject only to those pursuing their studies for a degree or a diploma in architecture.

Besides basic concepts in sociology, some aspects of urban sociology and research methodology have been included in the syllabus of engineering institutions. These are given below in detail:

(a) *Basic concepts*: Outline of sociological perspective, individual and society, prerequisites of a society, society and environment, community, groups association, institutions, meaning and process of social change in modern India. Sanskritization, modernization and secularization, social stratification – caste and class, status and role, socialization, biological, psychological, and ethnological foundations of human behaviour, caste system, law of inheritance and succession and position of women in Indian society, heredity and environment, types of family, sociological significance of family, family problems of today, characteristics and problems of developing society with special reference to India, identity and conflict, scientific and technical revolution, consensus, conflict and polity, social evolution, and change from primitive to civilized society.

Impact of science and technology on culture and civilization, society, personality and cultural development, conformity,

deviation and social control, and values.

(b) *Urban sociology*: Rural and urban life, folk – urban continuum, studies of urbanization, culture of cities and trends of urban growth, demographic aspects, planning in cities, social, psychological and other aspects of housing, research in urban society, spatial and temporal patterns of cities, sociology of development, its stratification, structure and process, study and analysis of data of Indian cities, open and closed system, urban settlement as an open system.

Systems analysis, industrialization and industrial society, industrial and occupational structure, structure and function of work organization, leadership, morale and productivity, problems of Indian industry.

Social problems in India, sociological approaches to the study of social problems.

(c) *Research methodology*: Methodology of social sciences, nature and types of scientific explanation, concept formulation and definition, measurement, design or experiment, operational aspects of research, approaches to the study of social phenomena, evolutionary, historical, comparative, positivistic, integration, and conflict stand point in social enquiry.

Psychology

Of the six institutions which teach psychology to their students, one is a college of architecture. The details of the topics covered in the subject are :

(a) *General*: Scope and method of psychology, basic principles and concepts in modern psychology, principles of psychology in human performance, learning, forgetting, and remembering, attention and perception, and intelligence.

(b) *Social psychology*: Definition and scope of social psychology, social practices, attitudes and opinions, social perception, group norms and values, group dynamics, leadership and inter-group conflict, psychological factors in mental health, human mind, and behaviour.

(c) *Industrial management*: Organizational psychology, group morale and motivation, supervision, communication, and human relations in industry, physical environment, Taylorism and scientific management, human relations in organizations.

(d) *Industrial psychology*: Scope and subject-matter of industrial psychology, social, psychological, and economic foundations of industrial psychology, industrial societies, and social factors in modern industry, maladjustment types, characteristics of leadership, methods of personnel selection and industrial training, public opinion and propaganda, and accidents.

Political science

Political science is taught in 7 institutions. In 2 institutions it forms a part of the paper in humanities or social science and in the remaining 5 it is offered as a comprehensive paper. The details of the topics are analysed below:

Definition, subject-matter and scope, utility of the subject-matter in general and in technological institutions, political science and other social sciences, political ideologies (democracy, liberalism, socialism, capitalism, individualism, communism, internationalism, and rationalism), various aspects of citizenship and state, society, social organization, associations, communities, neighbourhood group, village, urban, religious and linguistic, various forms and functions of government, political parties of India, Indian Parliament and State assemblies, political problems of modern India, national integration, various aspects of the Constitution of India, U.N.O., political socialization, political culture, modernization, and social change.

3. Social sciences in medical institutions

Content analysis of the syllabi of medical colleges is based on the syllabi received from 19 medical colleges. This covers the medical colleges located in 14 States and one Union Territory.

A scrutiny of the various syllabi reveals that the paper on social and preventive medicine among other subjects covers a good deal of social sciences. All the students undergoing medical training take this paper. The details of the social science contents covered in this paper and the number of institutions is given below:

Sociology, Demography, Biostatistics	3
Sociology, Psychology, Demography, and Biostatistics	2
Sociology, Psychology, Anthropology, and Medical Social Work	2
Demography and Family Planning	2
Sociology	2
Demography and Vital Statistics	1
Sociology, Psychology, Demography, Anthropology, and Family Planning	1
Sociology and Psychology	1
Vital Statistics and Biostatistics	1
Vital Statistics and Psychology	1
Vital Statistics	1
Social Science	1

The discipline-wise break-up shows that 11 institutions have included sociology in the social and preventive medicine paper. The other social sciences included are: demography (9), psychology (8), biostatistics (7), vital statistics (5), anthropology (3), family planning (3), elementary social science (2), and social work (1).

There are two other universities which teach psychology as a part of some other paper. In one university it forms part of the paper on medicine, and in another it is covered in the physiology paper.

We can now briefly discuss the content of each of the social science subjects.

Sociology

Sociology is taught in medical colleges affiliated to 11 universities. Of these, two have only introductory courses. In one college special emphasis is given to the concept of social medicine. In most of the universities the topics covered are more or less similar. The most frequently taught topics are: society, community, social organization and institution, culture, family and marriage, social change, social control, socialization. There are a few other topics which are taught in not more than one university. These topics include: aims and objectives of medical sociology, groups, kinship, magic and religion,

social stratification, status and role, responsibility of the physician to society. Three universities deal with general social problems.

Demography

Demography is included in the syllabus of nine institutions. Only one has given the details of the topics covered under this section. The topics specified by that institution include: national demography, population of India, and world population.

Psychology

Psychology is taught in 11 universities. In eight of these universities it forms a part of the paper on social and preventive medicine.

Apart from general psychology, institutions expose their students to a specific branch of psychology called normal psychology. The various topics covered under this branch are: definition, scope and method of normal psychology, relation between mind and body, personality, sense organs, images, perception, attention, memory, learning, thoughts and language, instincts, feelings, emotions, moods, and unconscious and mental process.

The topics covered in the remaining institutions are: definition, scope and methods of psychology, branches of psychology, disintegration and diseases of personality, socialization, inter-personal influences, role and role conflict, inter-group tensions, and prejudices and development of the organism.

The various branches of psychology to which the medical graduates are exposed include: normal psychology (5), general psychology (2), abnormal psychology (2), social psychology (1), and development psychology (1).

Anthropology

Only three colleges have included anthropology in their syllabi. Of these, two colleges have not given any details. The syllabus of the third college includes the following contents:

cultural, social, and medical anthropology, attitude and behaviour patterns in different parts of India with reference to health and illness, and the role of the physician in medical health.

Family planning

Of the three institutions offering courses on family planning, only one has given details of the courses. These are as follows: scope and need for family planning, national family planning programme, contraceptive methods and family planning as an integral part of comprehensive health care programme.

Social work

The details of the topics covered under this heading are not available.

Social sciences

The meaning of social sciences is taught in two institutions. The difference between social and behavioural sciences is also taught in these institutions. The relationship of social sciences to medicine is also covered in one institution.

Biostatistics

Two of the seven institutions that cover biostatistics in social and preventive medicine paper have not given the details of the topics. The remaining institutions cover the following topics: statistical methods, tabulation, groups, spot-maps, average rate, mean, median and mode, normal curve, and common errors in the collection, analysis and interpretation of rates.

Vital statistics

The topics covered under this heading are more or less the same in all the five institutions. The topics are: census,

registration of births and deaths rate and mortality rate, and life tables, etc.

In addition to these subjects, scanning of the syllabi of the five institutions (which sent their complete syllabi) reveals that in all the institutions the medical graduates are exposed to the legal aspects. This is covered under the forensic medicine paper. The aspects covered are: legal procedure in criminal code, identification, post-mortem examination from medico-legal point of view, death in its medico-legal aspects, mechanical injuries and wounds and their medico-legal aspects, medico-legal aspects of sex, medico-legal questions relating to abortion, therapeutic and criminal infanticide, medico-legal aspect in insanity, medical jurisprudence, and law in relation to medicine men, and toxicology.

SOCIAL SCIENCES IN THE EDUCATION OF PROFESSIONALS : OVERVIEW OF CURRICULUM CONTENTS

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SOCIAL SCIENCES are taught to the students specializing in the fields of agriculture, engineering, and medicine. But the nature and extent of social sciences covered in each of these disciplines varies considerably. In fact it has been observed that such variations exist not only between each of these disciplines, but even within the same field the emphasis given to social science subjects differs from institution to institution. It is important to find out the nature and extent of the social science content covered in each of these disciplines.

In order to get a comprehensive picture of the social sciences covered in agricultural, engineering and medical education the Indian Council of Social Science Research had sponsored a study to content-analyse the curricula in these disciplines. This study was conducted by Dr. S.K. Gupta. He had content-analysed the curricula of each of these disciplines and detailed the social science contents covered in different parts of the country. This paper attempts to present an overview of the social science content covered in different disciplines based on the content-analysis done by Dr. S.K. Gupta. In order to accomplish the task, the syllabi from these professional institutions were obtained and their contents analysed. It may be noted that 19 agricultural, 31 engineering, and 19 medical institutions had sent the syllabi. It is important to note that though two or more institutions teaching the same discipline may be affiliated to the same university, and may be following the same curriculum they have been treated separately in this analysis.

It may also be observed that medical students are compulsorily required to study preventive and social medicine. This subject lays emphasis on community health, through which the students are exposed to social sciences. This exposure is, however, different from the one experienced by agricultural or engineering students. To an extent it is "integrated" with other more "professionally relevant" subjects. The most popular book on preventive and social medicine in India is the one by J.E. Park.* The fifteen chapters contained in the book relate to:

1. Primitive Medicine to Community Health
2. Concepts in Community Health
3. Genetics and Health
4. Sociology and Health
5. Nutrition and Health
6. Environment and Health
7. Epidemiology
8. Family Planning
9. Preventive Medicine in Obstetrics, Paediatrics, and Geriatrics.
10. Occupational Health
11. Mental Health
12. Medical Statistics
13. Education for Health
14. Administration for Health
15. International Health

In this book, social sciences figure in Chapters 4, 8, 11, 12, 13 and 14. Concepts from the disciplines of sociology, demography, psychology, statistics, education and management are taught to medical students. In the course on medical jurisprudence, some introduction to law and criminology is given.

Similarly, in agriculture, extension education is one such course in which concepts from the fields of education, psychology and sociology are integrated to equip the students to effectively deal with individuals, groups and communities. It is designed to enable professionals to acquire skills to educate, motivate, involve, and mobilize people for accepting and

adopting programmes of development and change. This course, although not compulsory like the preventive and social medicine course, is quite popular.

Against this background we shall present a comparative analysis of the social sciences taught in medical, engineering, and agriculture education. It is clear from Table 1 that in agriculture stress is laid on economics and sociology, while in medicine, sociology and psychology are prominent. In engineering, economics alone has a distinctive place, followed by sociology. It is interesting that economics is not taught to students of medicine. Similarly, by examining the content distribution in sociology, it can be seen that the teaching of sociology is most emphasised in agriculture (64 %) followed by medicine (43 %). It is taught only in 24 per cent of engineering institutions covered in the study. Furthermore, psychology

Table 1. Comparative picture of the social science contents covered in the Professional disciplines of agriculture, engineering, and medicine

Subject	Agriculture N=22	Engineering N=34	Medicine N=23
1. Economics	21 (95.45)	27 (79.41)	—
2. Sociology	14 (63.64)	8 (23.53)	10 (43.17)
3. Psychology	1 (4.55)	5 (14.71)	12 (52.17)
4. Anthropology	—	—	3 (13.04)
5. Political science	—	3 (8.82)	—
6. Research methodology	—	3 (8.82)	—
7. Agriculture extension	9 (40.91)	—	—
8. Extension education	10 (45.45)	—	—

Notes: 1 Percentages reported above do not add up to 100 because more than one social science subject is taught in an institution.

2. N stands for the number of institutions from which responses were received.

finds a more important place in medicine (52%) compared to agriculture and engineering. However, a close scrutiny of the contents covered in extension education suggests that even in agriculture a substantial number of psychological and educational concepts are covered. In fact, the extension education course draws heavily on psychology. It may be seen that as many as 45 per cent of the institutions imparting agricultural training offer extension education. Thus if we combine psychology and extension education taught in agriculture training institutions, we find that about half of the agricultural institutions cover psychology. Therefore, it can be observed that economics, sociology and psychology find an important place in agriculture and engineering, whereas only sociology and psychology figure prominently in medicine, and economics is almost eliminated.

As regards other social science disciplines, they are covered only in one of the professional disciplines and completely left out in others. For instance, 32 per cent of engineering institutions teach political science and 13 per cent of medical institutions cover anthropology in their curriculum. It is also significant that about 9 per cent of engineering institutions have a specific course in research methodology in social sciences. This is, in addition, familiarizing them with social science concepts.

Social science contents covered in different professional courses

Having presented a comparative picture of the social science contents covered in each of the professional disciplines, it would be valuable to examine to what extent each of the social sciences is covered in different professional disciplines. We shall confine our discussion mainly to those social science disciplines such as economics, sociology, and psychology which find a prominent place in professional education.

Economics

We may start with the teaching of economics and its sub-specialties. As noted in Table 1, economics is not included in the curriculum of medicine. There are only two professional

disciplines, namely, engineering and agriculture, which include economics in their curriculum. But in both these disciplines only elementary economics is taught (Table 2). However, in the case of agriculture, about 45 per cent of the institutions cover one of its sub-specialties, namely, Agricultural economics, and about 14 per cent cover two other sub-specialties, namely, economic planning and production economics. As against this, in engineering various sub-specialties find place only in one institution. Thus, it may be observed that the professional disciplines which cover economics mainly teach its elementary principles and do not include sub-specialties except in agriculture, where agricultural economics is taught.

Table 2. Teaching of economics and its sub-specialties in professional institutions

Subject	Agriculture N=22	Engineering N=34	Medicine N=23
1. General economics	21 (95.41)	27 (79.41)	—
2. Planning & economic planning	3 (13.63)	1 (2.94)	—
3. Agriculture economics	10 (45.45)	1 (2.94)	—
4. Economic development	1 (4.45)	1 (2.94)	—
5. Production economics	3 (13.06)	—	—
6. Econometrics	—	1 (2.94)	—
7. Industrial economics	—	1 (2.94)	—

Sociology and its sub-specialties

The teaching of sociology occupies the second position in all the professional disciplines. It is more emphasized in agriculture as compared to medicine and engineering. However, it is evident from Table 3 that like economics, elementary sociology figures more prominently than any of its

sub-specialties. It is however, interesting to note that in agriculture some institutions teach rural sociology and do not cover elementary principles of sociology. In agriculture there is a great emphasis on rural sociology. In the case of engineering sub-specialties such as industrial sociology, urban sociology and sociology of development are included in the curricula, although each of these figures only marginally in the discipline as a whole. In fact, a close scrutiny of the data reveals that only I.I.T. Kanpur, has an extensive teaching of sociology and its sub-specialties.

In medicine also elementary sociology finds prominent place (43.4%) followed by sociology of medicine (17.3%). It is interesting to observe that medicine also covers social problems such as crime, delinquency, prostitution, and problems of the aged.

Table 3 Teaching of sociology and its sub-specialties in professional institutions

Sub-specialties	Agriculture N=22	Engineering N=34	Medicine N=23
1. Elementary sociology	14 (63.66)	27 (79.41)	10 (43.47)
2. Rural sociology	14 (63.66)	—	1 (4.34)
3. Industrial sociology	—	1 (2.94)	—
4. Sociology of medicine	—	—	4 (17.39)
5. Urban sociology	—	2 (5.88)	—
6. Sociology of development	—	1 (2.94)	—
7. Social problems	—	—	3 (13.04)

Psychology and its sub-specialties

Psychology receives the highest place in the profession of medicine, and the lowest in agriculture. But, as pointed out

earlier, although psychology *per se* does not appear in the agricultural curriculum a good many concepts of psychology are covered in extension education. As for the sub-specialties of psychology, general psychology figures prominently in medicine and engineering (Table 4). Industrial psychology and social psychology appear only in engineering. Compared to this, normal psychology and social psychology are covered in 21.73 per cent and 17.39 per cent of medical institutions respectively. This is surely a positive indication of the acceptance of various sub-specialties of psychology in medicine.

On the whole, it is evident that psychology and its sub-specialties do not find adequate place in professional disciplines other than in medicine.

Table 4 Teaching of psychology and its sub-specialties in professional institutions

Psychology and its sub-specialties	Agriculture N=22	Engineering N=34	Medicine N=23
1. General psychology	1 (4.54)	5 (14.70)	12 (52.17)
2. Educational psychology	7 (31.81)	—	—
3. Normal psychology	—	—	5 (21.73)
4. Social psychology	—	1 (2.94)	4 (17.39)
5. Abnormal psychology	—	—	2 (8.69)
6. Developmental psychology	—	—	1 (4.34)
7. Industrial psychology	—	2 (5.88)	1 (4.34)

An overall review of the social science contents covered in various professional disciplines indicates the following:

1. The degree of acceptance of various social sciences in different professional disciplines varies considerably.
2. The extent of coverage of social sciences also varies

considerably from discipline to discipline.

3. Most of the institutions cover elementary concepts of social science disciplines. Only a few institutions teach the sub-specialties in any depth.

ADOPTION OF SOCIAL SCIENCES IN HIGHER AGRICULTURE EDUCATION

Y.P. Singh, Udai Pareek, and D.R. Arora

WHAT HAS BEEN the post-entry fate of social sciences in agricultural education? Did they face any teething troubles? If so, how were they overcome? How far have they progressed? These questions emerged in the process of the deliberations of the Committee on Social Science Teaching in Higher Agricultural, Engineering, and Medical Education, jointly sponsored by the Indian Council of Social Science Research and the University Grants Commission. No report was available to answer these questions.

Answers to these questions are not only of academic interest, but also of practical utility.

Delineation of the problem

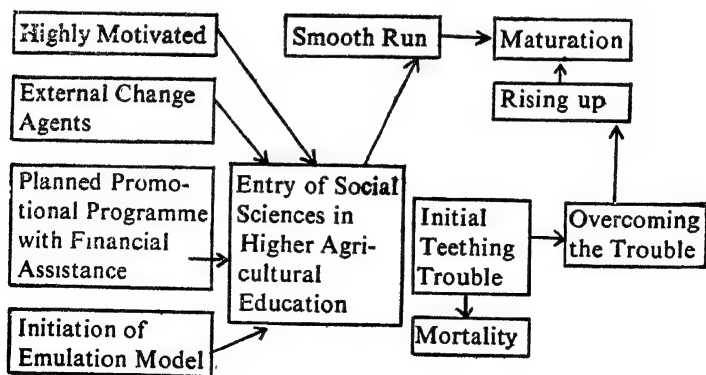
At present five social science disciplines are seen in the agricultural education system. These are : agricultural economics, extension education, rural sociology, agricultural business management and journalism. Among these, agricultural economics is the oldest. Its association with agricultural education dates back to the thirties. It has become so well-integrated with agriculture that many present agricultural economists are not able to trace its entry and growth. Rural sociology as an independent department exists only in one university, so also agricultural business management and journalism. Extension education is the only subject which is new and also widely adopted. It was first introduced in the fifties and the first post-graduate programme was in 1955. Therefore, all the post-graduate departments are of the period between 1955 and 1972. The recency of its introduction facilitates recall and fairly wide-scale

adoption provides an adequate sample-size to see the variations. Also once an institution adopts extension education, more basic social science disciplines such as sociology and psychology automatically creep in. Many first generation teachers of extension education are available. Because of these unique advantages associated with extension education from the point of view of the present study, it was decided to keep the study confined to the level of entry of graduate programmes of extension education in agricultural systems. Therefore, this report deals with the entry and the growth of extension education in agricultural systems. We feel, however, that this approach would be useful in the study of the entry of any discipline in any system and, thus, help scholars in institution-building and educational innovation.

Conceptual model and its testing

In order to carry out the study, some kind of conceptual framework was needed. Based on the authors' experience and a few depth interviews of the persons associated with the entry and the growth of extension education in agricultural education, a conceptual framework was developed.

Fig. 1. Conceptual framework of the entry of social sciences in higher agricultural education



The conceptual framework as developed at this stage is given in Figure 1. The figure indicates that there are four possible

routes through which this programme could have entered the agricultural education system. These are : (a) Highly Motivated Power Figure, (b) External Change-Agents, (c) Planned Promotional Programme, and (d) Emulation Model.

Having entered through any one of these routes, the discipline can take two routes – a “smooth run” route under a hospitable climate progressing towards maturity, and a route which encounters initial “teething trouble”. Faced with the problem of initial teething trouble, it can either suffer casualty or overcome the trouble and gradually strike roots.

Testing the model

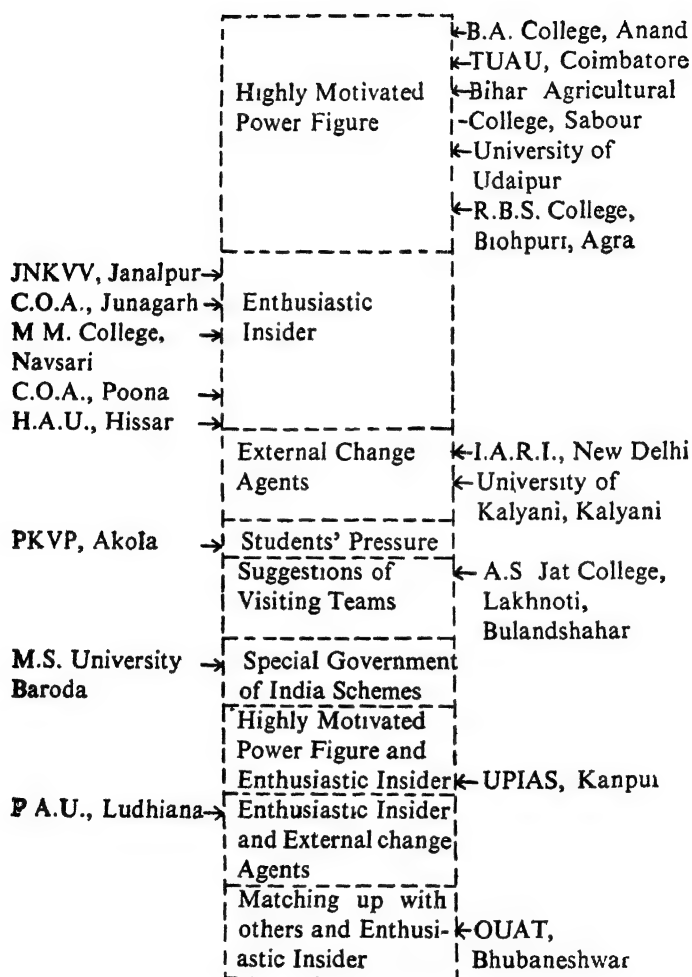
Based on this conceptual framework, many questions arise. Are there more entry routes? In how many institutions did it have a smooth run? And in which others did it experience trouble? What was the nature of the initial teething trouble? How did the institutions overcome this trouble? After considering the pros and cons of various methods, which could be developed in finding answers to these questions, it was decided to stick to depth interviews of selected personnel in the country. In 19 institutions some key members were identified and interviewed. As far as possible, an attempt was made to interview the founder-head of the department or the founder members of the department. If they were not available in the same department, they were contacted at the place of their present posting.

A content analysis of these interviews to identify the entry pattern shows that this subject entered either through any one of a combination of seven different routes. The different modes of entry are shown in Figure 2. The name of the institution and its connection with a particular route has been designated by the use of arrows.

Post-entry plight

Following entry, at different institutions the subject encountered two different types of situations and this determined their subsequent problems. One group had a smooth run, the other group encountered initial teething troubles. Those who had a smooth run, gradually moved to a stage of establishment.

Fig. 2. In-gates of social sciences



Those who encountered initial teething troubles moved in two directions. Some struggled and overcame the trouble while a few suffered casualty. The important question to be examined at this point is: How did the programme suffer mortality? What was the nature of the teething trouble? How was this overcome?

The initial teething trouble

The nature of the initial teething troubles experienced by different institutions are: lack of trained staff, lack of finances, lack of clear-cut job opportunities for the graduates of the department, poor pay scales, lack of literature, and misconceptions about the subject.

Overcoming the trouble

It is hard to say whether these troubles have been overcome. Probably many of them still exist. But the changing environment and the efforts of some key personnel have certainly brought them to a lower limit.

Over a period of time the problem of lack of trained staff has diluted substantially. With the emergence of the agricultural universities, the problem of finances has been solved to a large degree. To clear up the problems of misconception and lack of recognition, several steps have been taken by the individual institutions and the group as a whole. The formation of the Indian Society of Extension Education in the mid-sixties helped people to come together on a common platform and discuss issues of common concern. Various key personnel of agricultural research were invited to attend several seminars and they saw for themselves the utility of this discipline. Among those who developed a favourable attitude towards this discipline, is Dr. M.S. Swaminathan, now the Director-General of the Indian Council of Agricultural Research. The publication of the *Indian Journal of Extension Education* also helped a great deal in promoting the research aspect of this discipline. Seeing the application of sophisticated tools and techniques in extension research, others also got the awareness that extension could be as precise and rigorous as any other agricultural discipline.

In some institutions where a planned strategy of boosting the ability perceptions of this discipline was adopted, other steps were also taken. One such step was through the presentation of papers in pure agricultural subjects' seminars from an extension angle. Similarly, by attending the Dairy Science Congress, the dairy extension group has helped to promote recognition. Introducing social science variables in the administrative decision-

making has also helped. Some extension personnel have been utilized by the agricultural education administrators for preparing institutional development plans and reporting on different aspects of problems dealing with agricultural education. Presenting this subject according to the frame of references of the professional administrator has also helped them perceive its importance. Much has been achieved in the course of day-to-day personal discussions among faculty members. The strategy of answering questions through other questions has worked well in such discussions.

The growth of the input industries and the financing of agriculture through commercial banks has greatly helped in solving the job problems of graduates of extension education departments. It has also provided additional avenues to its alumni. Of course, the need to clearly earmark jobs still remains, particularly in agricultural departments.

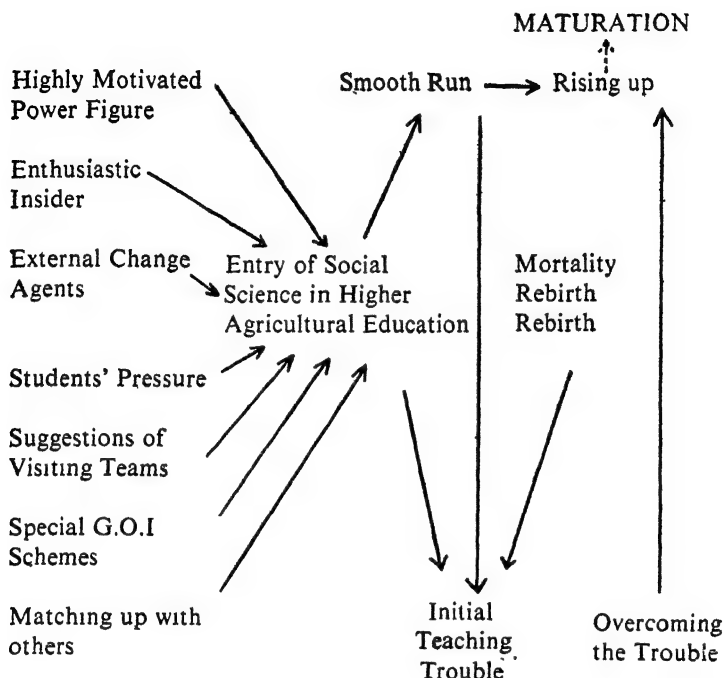
Without the use of clear indicators it is difficult to say how many of these departments are firmly established within their institutions. Of course, no attempt was made in the present study to develop and quantify suitable indicators. But from the subjective reports provided by the staff of the departments, one gets the feeling that most of them have crossed the teething trouble line and are now faced with some higher level problems. Some of the problems being faced by them have been reported in the "Survey of Social Scientists in Technical Institutions" conducted by the Study Team on "Social Sciences in Higher Professional Education". In order to avoid duplication, they have not been discussed here.*

Reformulation of the conceptual framework

Based on the information reported in the preceding pages, the conceptual framework for entry and growth presented in Figure 1 has been reformulated and is given in Figure 3. Seven entry modes of the programme in agricultural education are shown. The figure also shows broad forms of the post-entry plight of the subject as observed in the various institutions covered by the study. The arrow from "rising up" to "maturation"

*See Atal, Yogesh, "Social Scientists in Technical Institutions" in this volume.

Fig. 3. A revised model for the entry and growth of social sciences in higher agricultural education,



has been shown by dotted lines. This has been done because we still feel that maturation has not been achieved. However, most of the departments are heading towards this state.

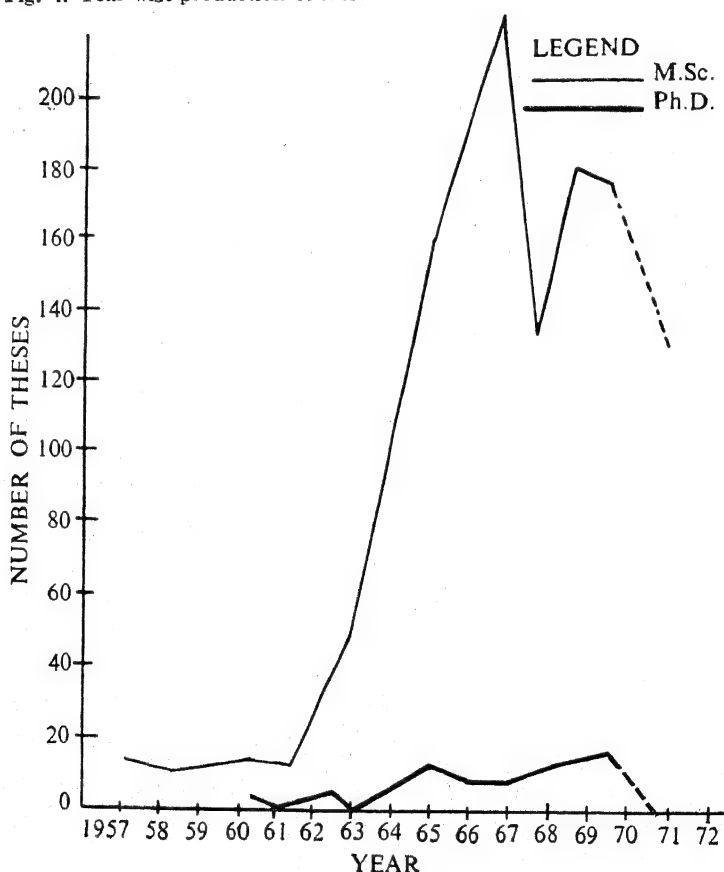
Progress through the years

Keeping in view the constraints of the situation the number of graduate theses produced by the different institutions have been used as an indicator of the progress of the departments. Of course, the progress made by a department cannot be judged only by this method, for the obvious reason that the number of theses produced says nothing of the quality of the theses and other non-tangible criteria of the quality of the department. This

is one major limitation in this approach. The number of theses has, therefore, been used as a compromise indicator.

The temporal growth of the subject has been judged by the number of theses submitted in different years for different degrees. The distribution of these according to colleges and universities, the subjects covered by these theses, the type of respondents covered by these studies, the type of research tools used for data collection measurement and analysis, and the geographical distribution of the studies in terms of locale of the studies covered by the theses have also been covered in the present analysis. In all, 1334 theses have been covered.

Fig. 4. Year-wise production of theses



Temporal growth

The year-wise submission of the M.Sc. and Ph.D. theses in the country is shown in Fig. 4. The data for 1972 are not complete because the institutions were visited during the period August 1972 to January 1973.

From 1957 to 1964, there is a steady rise in the number of M.Sc. theses. After 1964, there is a steep rise and the trend continues up to 1968. Then there is a decline in the year 1969, but even then it remains above the 1964 level. It again rises in 1970 but declines slightly in 1971. Of course this decline is only by 4 points which can be considered as a "natural bump" in the life of a subject. In the graph it is again seen as falling in 1972, but as stated earlier, the figures for 1972 are not completed. (The line joining the 1972 point has, therefore, been shown as a dotted line.) Several reasons may have contributed to this. No thesis was approved in Andhra Pradesh that year; Meerut University dropped the requirement of thesis for M. Sc. in extension education in the year 1967, therefore, "high-yielding" colleges at Baraut and Lakhnoti which were producing approximately 30 theses per year did not produce any; the Lady Irwin College which in the preceding years produced 19-20 theses, produced only 7 in 1969; Kulbhaskar Ashram at Allahabad, another "high-yielding" centre, also had fewer theses in the year. This decline, in our opinion, should not be considered unfavourable because it is largely due to the non-submission of theses from the low-budget institutions. Taking the life of the discipline to be 16 years (1957-1972), on an average 80 M.Sc. theses per year have been produced. Of course, now that approximately 30 institutions have full-fledged Master's programmes in extension education, we can expect an annual production of approximately 140 to 150 theses per year.

The first Ph.D. thesis was submitted in 1961. Except for gaps in 1962 and 1964, the rise has been steady. It touches the peak in 1971 when 15 persons got their Ph.D. During this year, the Indian Agricultural Research Institute produced 11 Ph.Ds. and Ludhiana 4. However, now that some other institutions have also started Ph.D. programmes, we can estimate the annual production to be at the rate of 7 to 8 theses per year.

Institutional distribution of theses

The 1,273 M.Sc. theses are the contribution of 34 different institutions. The Ph.D. theses (61) are mainly from the Indian Agricultural Research Institute (52), followed by the Punjab Agricultural University, Ludhiana (7). Other institutions have contributed only 2.

Looking at the institutions individually, the U.P. Institute of Agricultural Sciences, Kanpur, tops the list with 119 M.Sc. theses closely followed by Agra and Sabour. It is surprising that some of the better-funded institutions in agriculture do not have higher rank in terms of the total number of theses produced.

In terms of per annum production, the first five institutions are: Lakhnoti (18.3), Kulbhaskar Ashram (13.8), B. R. College, Agra (13.4), Barut (12), and Kanpur (11.9) against an average of 5.7. Here too, the high-budget institutions have lost the race. The corresponding figures for the Indian Agricultural Research Institute, Punjab Agricultural University and Haryana Agricultural University are 4.2, 5.3, and 2.5 respectively.

University-wise distribution

In terms of universities, at least 30 institutions had an M.Sc. programme between 1955 and 1972. Some "high-yielding" universities are Agra (269), Kanpur (116), and Kalyani (85). In Kalyani, the number of theses does not synchronize with the number of candidates awarded degrees because of the prevalent system of multiple theses.

State-wise distribution

Of the total M.Sc. theses (1,273), 464 (approximately one-third) are from U.P. alone. This is very much in line with the position in the country regarding agricultural graduates. Of the total agricultural graduates in the country, approximately one-third are from U.P. Furthermore, one-third of the unemployed agricultural graduates are also from U.P. Next comes Maharashtra

with 121 theses amounting to 9.5 per cent. The two taken together account for 45.9 per cent of the total M.Sc. theses in the country.

Geographical distribution

In terms of locale of the studies, 18 States/Union Territories have been covered although the programmes are located in only 14 States (inclusive of Delhi). The most highly researched States are U. P. (405) and Maharashtra (158). The thinly covered States are Jammu and Kashmir, Himachal Pradesh, Kerala, and Assam. There is no study in Manipur, Meghalaya, Nagaland, and Tripura. Similarly, 7 Union Territories viz., Andaman and Nicobar, Dadra and Nagar Haveli, Laccadive, Minicoy, Amindivi, Mizoram, and Pondicherry, have not been touched by any of the 1,334 studies reviewed here.

In terms of districts, 157 districts have been covered, though the institutions conducting the studies are located in 29 districts only. Another interesting feature is that most of the studies are concentrated in the districts where the institutions are located followed by the agriculturally most progressive districts of the State.

Intra-nation inflow-outflow

Except for Mysore and West Bengal, all institutions have addressed some of their studies in different States. The number varies from 1 to 14. Maximum outflow in terms of number of studies has been from Delhi (45) followed by Gujarat (14) and Andhra Pradesh (11). In terms of number of States covered by outflow studies, Delhi tops again having studies conducted in 12 States followed by Gujarat (8) and U.P. (6). Next come Andhra Pradesh and Rajasthan with 5 each.

Regarding inflow of the studies from other States, U.P. tops the list having received 16 studies from 5 different States followed by Maharashtra, Andhra Pradesh, and Haryana. The least inflow has been in Rajasthan followed by Delhi, Gujarat, Orissa, and West Bengal.

Subjects covered

One approach to examining social science studies is to analyse the subjects covered by them. Rural people are the subjects in 95 per cent of these studies. Of these 60 per cent are farmers. Considerable attention has been given to local leaders (173) and rural youth (116). Next to rural population, change-agents constitute another important group of subjects studied. Studies on rural women are comparatively few (61).

Agricultural labour does not seem to be a particularly favoured subject for extension studies. Tribal population has received negligible attention (7). Among the least touched subjects are scientists (6). Legislators and Parliamentarians have not been touched at all. (Figures within parentheses give the number of studies for each.)

Sampling procedures

Only 1,307 theses were available for analysis of the sampling procedures. Out of these, 194 have gone for complete enumeration. Approximately 89 have used sample-complete enumeration mix either in parallel or in series. In the case of mix in series, blocks, villages, etc. have been selected randomly, but complete enumeration of primary units has been done in the randomly selected villages.

The most frequently used sampling procedure was multistage simple random sampling (218) followed by random and purposive. Single stage simple random (146), probability proportionate to size (122), stratified single stage random sampling (101) besides cluster sampling, systematic sampling, and purposive sampling.

Research design

Again only 1,307 theses were available. The Research designs used in various studies are: survey (mostly ex-post-facto) (970), descriptive (105), experimental (104), evaluatory (94), case studies/case histories (30), and action research (4).

Techniques of data collection

The most frequently used technique is the interview schedule (1,232). Mailed questionnaires have been used on a limited scale (59), generally in studies on extension personnel. Next to schedules, the use of scales has the highest frequency (103). Observation techniques (78) and data from secondary sources (50) have also been considerably used as techniques of data collection. Other less frequently used techniques are case history and case study, sociometric schedules, informal interviews, interview guides, diary writing, group interviews, projective techniques, contextual studies, depth interviews, score cards, life history, etc.

Measures and scales used/developed

In all, 35 concepts have been measured through different techniques. The most frequently measured variables are attitude, knowledge and skill. Other dimensions are value orientation, adoption behaviour, innovative proneness, adoption, leadership, social status extension contact, performance rating for village level workers, efficiency rating, communication skill, need orientation, risk taking, education, method effectiveness, media participation, mass media exposure, interest, leisure time activities, conviction, group identification, economic motivation, social distance, political efficacy, role expectation, role performance worries, farm planning process, equipment adequacy, etc.

Analytical techniques

In all, 60 techniques of analysis have been used. Of these, 55 are statistical. The statistical techniques used are: percentages, chi-square test, coefficient for correlation, "t" test, mean, frequency distribution, "F" test, analysis of variance, median, mode, range, standard deviation, skewness, partial correlation, multiple correlation, coefficient of regression, coefficient of variation, standard error, binomial test, "Z" test, rank order, average discrepancy test, test of homogeneity of variance (Bartlett's Test), Turkey's Test "W", critical difference

(T^2) Test, Mahalanobis D^2 , factor analysis, Phi-test, paired comparison, Wilcoxon Sign Test, Wilcoxon Signed Rank Test, Fisher's Exact Probability Test, Mann Whitney "U" Test, and Kolmogorov Smirnov Test.

The above review shows that these studies meet the concern voiced at the last Asian Conference on Teaching and Research of Social Sciences held at Simla of injecting more mathematical reasoning in social science studies. The entry of most of these techniques of analysis is the outcome of the interaction of young enthusiastic learners, skilful social scientists and competent statisticians who could communicate on the wavelength of the enthusiastic learners and their social science guides.

Research areas covered

According to research areas, the studies have been classified as under: adoption and diffusion (384), agricultural education (34), communication (202), extension administration (133), extension methods (211), leadership and group dynamics (84), programme planning (164), research methods and techniques (12), rural institutions (13), social change, (28), socio-economic survey (19), special groups (46), training (100), and youth development (78). (The figures within parentheses indicate the frequency of studies.) Where a single study falls in more than one area, it has been credited to all the concerned areas.

Looking at the frequency in different areas, we find that the maximum number is in "adoption" followed by "programme planning", "extension methods", and "communication". Adoption alone accounts for 45 per cent. If we add the frequency of "extension methods" which also is a communication aid, the figures rise to 61 per cent.

SOCIAL SCIENCES IN HIGHER AGRICULTURAL EDUCATION : AN IMPRESSIONISTIC COMMENTARY

Y.P. Singh

AMONG ALL THE BRANCHES of higher professional education in India, agriculture is the one which utilizes social sciences most extensively. Social sciences have been integrated into the core curriculum of agriculture, veterinary, and animal sciences. In Punjab Agricultural University (PAU) and Haryana Agricultural University (HAU), an undergraduate agriculture student has to study 21 subjects through 80 courses which is equivalent to 249 credit hours. Of these, 229 are in core areas and 20 in electives. Of the 229 credits, the distribution in different branches are: agricultural sciences 52 per cent, basic sciences 28 per cent, social sciences 11 per cent, languages 79 per cent, and others 1 per cent. The definition of agriculture in the PAU Statutes provides scope for social sciences. According to the Statutes: "Agriculture means the basic and applied sciences of soil and water management, crop and livestock production and management, home science and the betterment of rural people."

The term "Agricultural Education" as used in the present paper includes: agriculture science, veterinary medicine, and animal science. All these fall under the purview of the Indian Council of Agricultural Research (ICAR). Home science colleges located in agricultural universities also come under the jurisdiction of the ICAR. This paper does not cover home science education, though the social sciences content in the home science curriculum is much more than in the agriculture, veterinary, and animal sciences curriculum.

Three social science disciplines are commonly found in the agriculture education curriculum. These are: agriculture/livestock economics, extension education and rural sociology. Chronologically first among these is economics, and last rural sociology.

The status, role expectations, problems, and contributions of the three disciplines mentioned above are very different. Even their roles in relation to each other vary from synergetic to antagonistic and, therefore, for the purposes of the present paper, the three will be dealt with separately. The major part will, however, be focused on extension education because this is one discipline which can operationally be called "general agricultural social science."

Agricultural economics was adopted in the agricultural curriculum long ago and is now a fairly well-recognized and well-accepted discipline in the agriculture curriculum. The Indian Society of Agricultural Economics is an important professional organization which was established in 1939. However, the teaching of agricultural economics in veterinary medicine is either missing or negligible. Approximately 10 credit hours of economics are taught in the B.Sc. (animal science) course. Agricultural economics will be discussed more in detail later.

Within the extension curriculum, psychology, sociology, anthropology, and economics are covered, each with a different focus. The subject is essentially multi-disciplinary in nature. Of late, it has become very important and is being taught in all the agricultural, veterinary, and animal science colleges. Also, with the coming up of agricultural universities committed to teaching, research, and extension, extension becomes one-third of the total responsibility of these universities.

Extension education

Except for agricultural economics, all the social sciences have entered the agricultural curriculum through extension education and, therefore, a detailed appraisal of the position of this discipline is meaningful. It is possible that if they had not entered through extension education, they might not have entered at all, or the entry might have been very difficult.

Historical background

Although agriculture extension work started with the

establishment of the departments of agriculture in the year 1860, the formal teaching of agricultural extension in agricultural colleges has a more recent history. The recommendation to include a paper on agricultural extension in the undergraduate agriculture curriculum was first made at the Hyderabad conference of the principals of agricultural colleges. Following this recommendation, most of the colleges started introducing agricultural extension in their undergraduate curriculum. The first to introduce extension was Bihar Agricultural College at Sabour and the first batch having read agricultural extension on a formal basis graduated in 1955. By 1960, all the agricultural and most of the veterinary colleges had introduced extension in their undergraduate curriculum in one form or another. Some started it as an examination paper, while others started it as a non-examination subject in which the students were required to complete 60 per cent of the lectures in their final year.

Several factors may have contributed to the introduction of extension in the curriculum. One factor was the growing awareness of the lack of trained Indian personnel. When the Community Development Programme was started in 1952 it was decided that each block should have an Agricultural Extension Officer who was expected to be conversant with extension methods in addition to agriculture technology. This could have been a factor motivating the principals to recommend the incorporation of agricultural extension in the undergraduate curriculum.

Another contributory factor was the Extension Wing Scheme of the Directorate of Extension, Ministry of Food and Agriculture, Government of India. The scheme provided for the establishment of an extension wing in agriculture/veterinary colleges to teach extension to the final year undergraduate students and to carry out extension activities in one community development block. One community development block was to be attached to each extension wing. The recipient institutions were to get a grant of 2 to 3 lakhs of rupees. The budget estimate had a provision for a bus, a jeep, audio-visual equipment, and approximately three to four professional staff. The size of the grant and the nature of the material it brought to the colleges, might have had an influence on the adoption of extension in the institutions.

During the same period, the Indian Agricultural Research

Institute (I.A.R.I.) had taken up extension work in 19 villages of Delhi in response to Shri K.M. Munshi's (the then Union Food and Agriculture Minister) call for the land transformation movement. This prompted the department of agronomy to initiate the teaching of extension. At that time, extension was taught as an integral part of a paper on crop production. It is interesting to look back on the course as it was taught then. The six pages of notes that constitute the entire section on extension and community development have been well preserved by a director of extension who studied during that time.

Before the Hyderabad conference, the Agricultural Institute, Allahabad, used to organise a one-month teaching course for its students. Participation in the course was voluntary. Students were paid a modest stipend and were given extensive training in the theory and practice of extension including in-village training. The programme was usually offered in the summer vacation and the interested final year students, after completing all their degree requirements, were enrolled in the course. The Institute also offered a number of *ad hoc* courses for different categories of personnel. These courses were the by-product of the Jamuna Par Punah Nirman Project (JUPAN Project) which had been initiated by Dr. A.T. Mosher in the fifties. The project will be discussed more in detail in the section on "Researches in Extension".

Barring a few exceptions, in the early days extension was taught even in colleges of agriculture either by economists or agriculturists. Many of the early professors had undergone the one-month training course in extension at the Allahabad Agricultural Institute, but some were even without this. This situation of self-styled professors of extension continued till 1961. Today this situation is a rarity.

Between the agricultural and veterinary colleges, agriculture was the first to accept extension in the curriculum. The veterinary colleges followed with some reservations. Even today the extension departments in some veterinary colleges are staffed by non-extension personnel. However, the recent initiation of the Division of Extension at the Indian Veterinary Research Institute (I.V.R.I.) will probably have an influence in strengthening the teaching of extension in veterinary colleges.

Post-graduate programme

The first full-scale Master's programme in extension education was started in the Bihar Agricultural College, Sabour in 1955. Even here, the introduction was fortuitous. Dr. R.H. Richharia, who was the principal of the college at that time, had submitted a proposal to the Government of Bihar for initiating post-graduate teaching in agronomy, horticulture, plant pathology, entomology, and agricultural economics. It so happened that Dr. J.S. Patel, the Director of Agriculture in Bihar, while scrutinizing the syllabus suggested that economics might be substituted by agricultural extension, and this was done.

An important figure in the development of extension education in India is Prof. P.R.H. Acharjee, who was the Professor of Agricultural Economics at Sabour. As early as in the fifties, he formulated a curriculum which was heavily loaded with social sciences. Of the eight papers, he had two papers in sociology, one full paper in social psychology, one paper in philosophy of education, and two full papers in agricultural economics. His interest in social sciences started during his studies for the M.Sc. in Agricultural Economics at the University of Michigan, East Lansing, U.S.A. where he had extensive exposure to sociology and social psychology. Even before the dawn of extension education, he was a great admirer of social sciences and humanities and a spokesman for giving these disciplines their due place in the agricultural curriculum. Unfortunately, Prof. Acharjee did not publish anything, so his ideas are not available to us in writing.

Jabalpur started a Master's programme in extension education two years later. During this period the I.A.R.I. had introduced extension as a branch of specialization in agronomy. Dr. P.C. Raheja, who was head of the division of agronomy, was the person responsible for this. He was a strong patron of extension in its early phases and did much to encourage the development of extension education. As a research agronomist of international repute, he could see the place of research in extension and would often assign research problems

in extension to his students. The early theses generally used the same research designs used in simple agronomic trials. Raheja also encouraged his students, who had gone abroad to get substantial exposure to extension. One such case is Dr. D.K. Mishra (Director of Extension, Udaipur University) who had done his M.Sc. thesis under Dr. Raheja and was in the United States in 1950 for his Ph.D. in Agronomy. Dr. Raheja wrote to him asking him to undergo adequate training in extension because the country had moved and was fast moving towards the acceptance of the concept of extension. In compliance with Dr. Raheja's suggestion, Dr. Mishra did his M.Sc. in extension after completing his Ph.D. in agronomy. Later, a chair of Professor of Extension was created in the department of agronomy and Prof. S.C. Vishnoi was appointed to it. Prof. Vishnoi continued the programme. His students were agronomy students and his responsibility was to teach courses in extension and guide students in research in extension. This continued till 1961 when the major revision in the extension syllabus at the I.A.R.I. took place. Vishnoi also started a Ph.D. programme. Students did their course work in agronomy, but their theses on extension problems were mostly on the effectiveness of extension methods and audio-visual aids. Vishnoi lived alone in one room in the old hostel (now girls' hostel) at the I.A.R.I. without a cook or a kitchen. He was fond of field work and was instrumental in establishing the Nangloi centre of the I.A.R.I.

During the late fifties Dr. J. Paul Legans, Professor of Extension at Cornell University, U.S.A., came to India on the invitation of the Ford Foundation. Dr. Legans authored a plan for establishing a division of extension at the I.A.R.I. which could offer full M.Sc. and Ph.D. degrees in extension. He prepared the syllabus, and even worked out the staffing pattern for the division. The Ford Foundation offered full grant for establishing the division including the cost of construction of staff quarters. By and large, the staffing pattern had been retained, but the syllabus was substantially changed when the Indian staff took over. Though the implementation of Dr. Legans' scheme went through considerable deliberations in the Ministry and the I.A.R.I., eventually it was sanctioned and Mr. A.R. Khan who had had long experience in

agronomy and also the experience of piloting the extension programme in the 19 villages of Nangloi was appointed as head of the division. Prof. Vishnoi had moved to Madhya Pradesh to take on the position of Joint Director of Agriculture.

In mid-1961, social scientists started coming to the division of extension. New goals were established, which changed the course of extension in India to a large extent. Further developments in extension education were fast taking place. In 1965, the Punjab Agricultural University, Ludhiana, which hitherto had only offered a Master's programme in extension, started a Ph.D. programme as well. In the same year, a Master's programme in extension was started for veterinary students at the Hissar campus of the Punjab Agricultural University. This was the first time that a Master's programme in extension was specifically designed and operated for students with a veterinary background. Unfortunately the programme was suspended in 1968. Ph.D. programme was started also at Jabalpur, Udaipur, and Anand from where 6-7 persons were successful in completing the degree. Today, a Ph.D. programme in extension education is offered at the I.A.R.I., New Delhi, Punjab Agricultural University, Ludhiana, Haryana Agricultural University, Hissar, and Udaipur University, Udaipur. Approximately 30 institutions offer M.Sc. in extension. In each department of extension, there is a position for a rural sociologist. The incumbents are usually persons holding degrees in sociology or social work. The I.A.R.I. has, in addition, a couple of positions for psychologists.

Curriculum

Under the traditional system, there was one paper in theory and one paper in practical extension. The theory paper covered some sociological and psychological concepts relevant to extension education. A copy of the old syllabus which was followed at the Punjab University appears in Annexure I. As is evident from the syllabus of the Punjab University rural sociology used to be an integral part of extension education. In agricultural colleges operating under the traditional system,

the same situation continues barring a few exceptions which provide room for an elective in agricultural extension education at the undergraduate level. In such cases, there may be more than four papers. At the agricultural universities, which work on the credit course system 2-3 courses in extension and 1-2 courses in rural sociology are compulsory for all the undergraduate students. The number of courses and the total number of credit hours in extension and in rural sociology in a few agricultural universities are given in Table 1.

Table 1. Compulsory extension and rural sociology courses at some universities

University	Courses	No. of Courses	Credit Hours
1. H A.U., Hissar	1. Philosophy & Principles of Extension Education 2. Communication & Extension Methods 3. Extension Programme Planning & Evaluation 4. Sociology of Economic Development 5. Introduction to the Sociology of Rural Life	5	13
2. A.P.A.U., Hyderabad	1. Rural Sociology 2. Principles & Methods in Extension Teaching 3. Community Development Extension in India 4. Programme Building in Extension Education	4	12
3. Orissa University of Agriculture and Technology, Bhubaneshwar	1. Rural Sociology 2. Principles of Extension Education 3. Extension Teaching Methods 4. Programme, Planning, and Evaluation	4	12
4. University of Udaipur	1. Extension Education and Rural Society 2. Extension Teaching Methods, and Programme Planning	2	5

Some universities, for instance Punjab Agricultural University, Haryana Agricultural University, University of Udaipur, Andhra Pradesh Agricultural University, also offered electives in agricultural extension and rural sociology. In this case, students have to take 20-22 extra credits in these fields. It is worth mentioning that out of the 8 areas in which electives are offered at the undergraduate level in the College of Agriculture, Hissar, 3 (extension education, rural sociology, and economics) are from social sciences. Of course, the enrolment in these areas is not at par with the enrolment in the main agricultural science disciplines. The content of the undergraduate curriculum has undergone a considerable change. Today, there is a tendency to teach some behavioural science concepts such as acceptance of change, communication process, teaching and learning, motivation, social action process, in the core extension courses. This was not the situation in the fifties or even in the early sixties. This trend started in 1965-66 when the Ph.D.s in extension started replacing the non-extension teachers teaching extension. In terms of flexibility of the curriculum and adaptability to contemporary societal needs, the agricultural universities operating on the credit course system have shown greater flexibility and adaptability as compared to the colleges working under the traditional system.

It might be mentioned that the undergraduate curriculum had been discussed thrice at the all-India meetings of the extension teachers. In the late fifties, a meeting for working out the curriculum was organized by the Directorate of Extension, Ministry of Food and Agriculture, Government of India. In October 1961, a curriculum conference was held at the Agriculture Institute, Allahabad. The purpose of these conferences was to develop a model curriculum for undergraduate extension teaching. In order to elicit the support of other relevant persons in the agricultural colleges for extension education, the heads of the different agricultural colleges were invited along with the professor of extension to take part in the third conference which was held at Simla under the auspices of the I.C.A.R. The impact of these joint deliberations is not known. In the first Summer Institute of the College Teachers in Extension, the question of curriculum and teaching extension in B.Sc. (Ag.) and B.V.Sc. was again

considered and a model syllabus developed. This was widely discussed and debated, but no report is available on its adoption in different institutions.

Several institutions such as the Punjab Agricultural University, Haryana Agricultural University, University of Agricultural Science, Bangalore and Orissa Agricultural University, have provision for in-village training for agricultural students at the end of the final year. The period varies from a fortnight to three months. The Orissa Agricultural University is the only one which spends full three months on in-village training.

Post-graduate curriculum

Three of the early institutions, viz., I.A.R.I., Sabour, and Jabalpur, emphasized three different chapters in their respective curriculum. The Sabour curriculum was heavily loaded with social sciences whereas at the I.A.R.I., basic social sciences were completely missing and the courses were confined to extension methods, programme development, and community development. Students had no exposure either to sociology or psychology. The bulk of their courses had to be from agronomy, agricultural economics, or statistics. The Jabalpur syllabus was almost a replica of the courses then recommended for the Masters' and for Doctoral students at Cornell. These different emphases were probably the result of the persons manning and heading the departments. The Sabour department of extension education was headed by Prof. Acharjee, who had his training in economics and sociology. The other faculty member, Dr. N.P. Akhouri, was a sociologist by training, and a general social scientist by experience. At the I.A.R.I., extension was a part of the agronomy department which was headed by an agronomist. The emphasis was thus on having more of agronomy and less of extension. At Jabalpur, both Professors Vishnoi and Chopde had their training at Cornell and started their programme at Jabalpur immediately on their return to India. Probably, they found it convenient to develop a syllabus on the lines of their training at Cornell.

In 1961, when the social science contingent reached the I.A.R.I., 20 courses were designed for extension education.

These courses covered such areas as community development, extension programme building, extension methods, psychological basis of human behaviour, attitude change and motivation, research methodology, measurement in extension research, social structure and organization, advanced rural sociology, communication process and media, audio-visual aids, rural leadership, human relations, group dynamics, etc.

At the sixth session of the Indian Council of Agricultural Education held at the Ranchi Agriculture College, Kanke, in October 1962, the question of formulating a syllabus for agricultural extension for the M.Sc. (Ag.) course was considered, and it was suggested that an *ad hoc* Committee be set up to prepare a model syllabus on the basis of the syllabi already prescribed by the I.A.R.I. and other post-graduate agricultural colleges in India.

Consequently, an *ad hoc* committee comprising Dr. S.M. Aijar Hussain, the then head of the division of agricultural economics of the I.A.R.I., Dr. K.N. Singh, then Professor of Agricultural Extension, Dr. O.P. Dhama, Professor of Extension, Jabalpur, Dr. J.B. Chittamber, Principal, Agricultural Institute, Allahabad, Mr. J.E. Croshy, Agricultural Extension Adviser, USAID, and Dr. Linwood Hodgson, Consultant on Community Development, the Ford Foundation, was set up to develop a model syllabus for the post-graduate programme in extension education. The model syllabus recommended eight papers: (1) Extension Education and Community Development, (2) Rural Sociology, (3) Research Methodology and Evaluation in Extension, (4) Statistics, (5) Programme Building, (6) Educational & Social Psychology, (7) Agricultural Communication, and (8) Thesis.

It is not known how many of the institutions adopted this syllabus, nor what, if anything, came in the way of their adopting it.

The erstwhile Punjab Agricultural University which re-designed its courses in 1966 had courses worth 80 credit hours listed under extension education. It might be worth mentioning that of all the disciplines listed in the *Resident Instructions Bulletin* of the Punjab Agricultural University, extension had the highest number of credit hours. During the last two months, two universities have reformulated their

courses for M.Sc. and Ph.D. A perusal of these courses might give an indication of the present-day trend in the extension curriculum. The list of courses of these universities, viz., Haryana and Udaipur, are given in Annexure II. It may be mentioned that at the Haryana Agricultural University students have to take 25 credit hours in their major subjects in the M.Sc. and 15 credit hours in their major field for the Ph.D., the remaining 25 for M.Sc., and the remaining 20 for Ph.D. have to come from the supporting disciplines. Thus, a student has the opportunity of having more of social sciences in the field of rural sociology, agricultural economics, and statistics, in addition to what he studies under his major field of extension education. These two syllabi show a number of new trends. For example, there are courses in measurement, training, and change which were not found in the earlier syllabi. This is the impact of the direction decided by the nucleus team of the I.A.R.I. in 1961. Courses on training have been influenced to a large degree by the expanding training activities in agriculture as well as the publication of the book *Training for Development* by Lynton and Pareek. This book has considerably influenced the extension trainers.

Acceptance of social sciences in agriculture

Today, social sciences occupy a distinct place in the agricultural curriculum. Animal science, of which there is only one college in the country, seems to follow the example of agriculture. The position in veterinary colleges, which are not under the agricultural universities, is different. In such colleges, the subject is still struggling for a rightful place. However, the progress that one sees in agricultural colleges today has not been achieved overnight. This is the result of the persistent efforts of a handful of persons working against all odds and criticism. Even today, there is enormous institutional variation. In some, it occupies a prestigious position. In others, it is nominal, while at Pantnagar, the post-graduate programme in agricultural extension has been discontinued.

In one institution, where extension gained high recognition and acceptance, it passed through the following four phases:

1. *"Laugh out" phase*: Wherever extension was introduced in the first two years, this was very badly misunderstood and laughed at. This author had the opportunity to participate in three extension departments at their initial stages. He found that the biological scientists looked down upon this discipline. At Sabour, where it was introduced for the first time, the reaction was hostile. People laughed at it and said that in the name of agricultural sciences, arts such as sociology and psychology were being taught. They felt that there was no need for these disciplines in agriculture. Some of the remarks about the extension in those days were: (i) This is a science of gossips. (ii) You are not required to know much of science; you just need to be a good photographer. (iii) It is not an academic subject; it deals with things like setting up of exhibitions and puppet shows. (iv) It's a means to give an impression of change when there is no change. (v) It is not a subject for intellectuals. (vi) Thesis writing in extension is story writing. (vii) Extension is no discipline. (viii) The supporters of extension have just picked up one paper from here and one paper from there and claim it to be a discipline.

There were numerous remarks such as the above. The extension personnel encountered them in the canteen, in the mess, in formal groups, in meetings, and everywhere. The extension personnel had to advance strong replies to these remarks. This kept the opponents quiet, but probably it did not change their opinion. In the early days people used the word "extension" as a synonym for bluffing and flattery. For example, a person would say "look here, this person is using extension on me", meaning thereby that the person was trying to flatter or persuade him to do something for his own gains, or that the person was trying to bluff him.

Another problem at the time was that almost everyone considered himself to be an expert on extension, regardless of his standing and worth in his own field. Similarly, almost everybody thought he knew what the model curriculum for M.Sc. in extension should be. The following examples illustrate the type of suggestions that were given in those days. An entomologist observed: "What is desired is that instead of these arts subjects, agricultural subjects such as entomology, pathology, agronomy, horticulture should be taught to

the extension students."

Another eminent person, who is now a strong supporter of researches in extension, told me in confidence: "Look, this is no syllabus. If extension is to be taught, it should include something of law and land revenue so that people could take jobs in the revenue departments and better succeed as BDOs." He did not see that social sciences could have any relationship to the job requirements of the Block Development Officer, although he wanted the extension people to become Block Development Officers. This attitude was also transmitted by some of the graduate students who had opted for extension not by choice, but by chance. For example, one person, who later became the head of a department of extension in east India, advised one of his colleagues who was just entering the department by choice to keep as close to agronomy as possible because in the real life situation, it was agronomy that was going to be helpful.

2. "*I said so*" phase: Unfortunately the status of the disciplines in these colleges is, by and large, judged by the jobs the alumni get. It so happened that the first group of graduates from Sabour college did not find suitable positions. They had to go back to the blocks as Agricultural Extension Officers, whereas their counterparts in other disciplines stayed in the college as Teaching Assistants or Research Assistants, though the scale of pay was the same. Life in research institutes and colleges was far superior to that in a block. At this stage, as criticism further intensified, almost everybody started taking credit for his foresight in predicting the fate of extension-trained personnel. Remarks such as "I had said three years ago that these extension guys were going to starve. There is absolutely no job for them and what is important is that not only are they underemployed but they are unemployable in the department of agriculture" are common. In reality, the situation was just the reverse. Nowhere were there more job opportunities than in extension, but the best jobs in extension were manned by anyone other than those who actually had a degree in extension. This was a discouraging phase, and the students then in the M.Sc. classes, with a few exceptions of those who had deliberately gone to this discipline by choice, questioned their wisdom in selecting this subject.

3. *"Let them stay" phase:* Soon the situation changed. Extension was listed in "category one", with the highest cadre strength in Bihar. Unemployment started creeping in to the other subjects. Other institutions elsewhere in India started M.Sc. programmes in extension. The faculty at Sabour gained recognition. At this point, the critics became silent overtly, though they still harboured doubts on the wisdom of teaching extension in agriculture colleges.

Meanwhile, the department got established. The faculty members gained a very good reputation as people started accepting the discipline passively. On a few occasions K.S.V. Raman, the then Chairman of the Bihar Public Service Commission, spoke well about this discipline. His appreciation further silenced the critics.

4. *"Welcome" phase:* Finally, the employment market changed in favour of extension. More and more alumni got better positions. Banks and industries started recruiting extension people. As a result, extension became the choice of many who got first divisions. Two years ago, Sabour admitted only those with a high first class B.Sc. (Ag.) to its Master's programme.

This, however, is the case of one college only. By no means does it reflect the whole situation. In many colleges, extension remains a low-preferred subject. Pareek, Kumar, and Jain (1965) studied the curriculum preference of the post-graduate students at the I.A.R.I. They found that extension received a low preference. It was third from the bottom. Kaul and Singh, in an unpublished study, replicated the same study on veterinary students. They found that extension was third from the bottom in this field also, though there were two veterinary disciplines which had scale values much lower than extension education. Kaul (1969) again replicated the study on agricultural students at Ludhiana by using the rank order method and found that extension received the lowest choice, followed by agricultural economics. In all the studies, the respondents were asked, "Suppose a student who can easily hope to get admission in any subject in M.Sc. seeks your advice for choosing a subject for higher studies, which subject would you recommend to him?"

There is, however, another side to the picture. Studies

conducted on the training needs of the Animal Husbandry Extension Officers in Punjab showed a high training need in the area of extension education (Sharma and Singh, 1969). As a matter of fact, the mean score for the training need in extension education was higher than the mean score for the area of animal husbandry, though lower than that for the clinics. Several reasons for the preference for extension over animal sciences have been advanced by the authors, and they will not be mentioned here. Another example comes from the utility perception of curriculum segments by undergraduate agriculture students. Three years ago, Akhauri and Singh did a simple exercise at Hissar, when agriculture students returned from their one-month in-village training. They were asked to relate the utility of each of the eight disciplines they had studied for their success in the field.

The eight disciplines were presented to them in pairs and they were required to tick one from each pair. Surprisingly, extension came out third from the top. The scale values of the different subjects were as under:

1. Plant Protection	1.607
2. Agronomy	1.499
3. Extension	1.477
4. Soil	0.873
5. Horticulture	0.815
6. Plant Breeding	0.793
7. Economics	0.087
8. Engineering	0.000 (lowest)

The data were further analysed according to the elective group, but the pattern remained almost the same. The minor deviation that occurred was in favour of extension rather than against it.

The exercise was repeated in 1969 with similar results.

Telescoping the two sets of data, we find that while the students consider this subject pretty useful for their life situation, they do not want to pursue higher studies in it. Probably, this is due to the low perceived job opportunities.

A surprising result has, however, been reported by Kaul (1970). He conducted an investigation with a view to exploring the

attitude of undergraduate students towards extension education at various stages of instruction during one academic session and to observe the contribution of selected variables towards attitudinal change. The mean attitude score declined almost steadily from 36.38 recorded in the first administration to 29.51 in the second administration, showing thereby that attitudes tended to become more and more unfavourable with the progress of teaching. It is difficult to reconcile this finding with the conclusions reported above. There can be two reasons. Since the subjects had not yet gone into the field and had not confronted the problem, they were not able to appreciate the utility of this subject. It is our common experience that once the boys are in job they return to ask for special help confessing that as students their main concern was simply to obtain a degree. Now that they are facing real problems they want to know a particular aspect of the subject in detail. This request generally comes from those who have accepted jobs in private firms. The second reason could be the teaching style. After all is said and done about the intrinsic utility of the subject, much depends on the way an individual instructor presents the subject. While the teacher variable is applicable in the case of all disciplines, it is probably much more so in the case of social sciences. Anyway, this study provides a timely warning, and all the institutions should look into the matter.

Accepting or rejecting a discipline on account of job opportunities is one thing and accepting it on the ground of its intrinsic value is quite another. For example, even if there are no job opportunities in physics, nobody would deny physics its rightful place in the academic world. We have our doubts if extension education is being accepted or rejected on similar grounds of its intrinsic value. Possibly many agricultural scientists, and more so the administrators of the agricultural programmes, are not in a position to visualise what exactly to expect from the extension scientist and how to make best use of the extension trained personnel. In my opinion, there is an enormous conflict between what extension people feel they should do and what the powers that be and the superiors feel they should be doing. Some common expectations from the extension education departments were that

they should be (1) performing all the public relations functions of the institution, (2) carrying out some agricultural development activities in the surrounding villages of the institution, (3) conducting demonstrations of the prestige release of institutional research in nearby villages and showing the same to visitors, farmers, and politicians. Possibly the role extension scientists can play as consultants, programme advisors, programme analysts, and persons who are concerned with developing greater insight into the development process is not yet well understood. This shall be discussed in detail when we go to the status of research in extension.

Of late, there have been interesting developments. While going through some of the speeches, particularly the Zakir Husain Memorial Lecture of Dr. M.S. Swaminathan, the Director of the I.A.R.I., one can see that here is a geneticist who is making extensive use of social science concepts. Even in his popular talks on the pointers for future research in agriculture, he makes adequate use of social science concepts. But, in spite of all this, even at the I.A.R.I., research in social sciences is not given the same emphasis as is given to other areas. It would be useful to analyse some of Dr. M.S. Swaminathan's speeches and isolate the frequency of social science concepts used in these. I might add that some of his most widely acclaimed speeches are those which utilize social science concepts rather than purely genetical or technical ones. Looking at him as a change agent, I find that here is the soft spot of change through which the entry of social sciences can be made. Dr. Swaminathan's acceptance will also amount to legitimization and will possibly have enormous influence on strengthening of social sciences in agricultural education and research.

Identity formation

Disowned by agriculture scientists and unclaimed by social scientists, extension suffered from an identity crisis which fortunately has been solved to a great extent during the past 15 years. It is my own experience that many social scientists also looked down upon extension education. Feelings can be best

expressed in Castillo's description of a project in the Philippines:

"Some social science researchers came to the college of agriculture with a stereotyped image of a cow college and were somewhat apprehensive about the social research competence of staff members. They did not expect to find social science literates on an agricultural campus. One even indicated a plan to stay around until his prospective co-workers 'pick up the skill of the trade'. Other incidents reflecting this attitude prompted a faculty member to comment 'I think he was even shocked to find out that we know how to prepare a questionnaire.'"¹

A few persons led by Dr. K.N. Singh, Head of the Division of Extension Education, I.A.R.I., worked for establishing a separate identity for extension. The first major success of this team was the establishment of the Indian Society of Extension Education *Sanghe Shakti Kaliyuge* with its headquarters at the I.A.R.I. in 1963. The society provided this strength to the extension personnel. It was a monumental task to proceed with the idea of a society in 1963, and they succeeded in this difficult venture. Mr. Khan was the first president of the Society, and on his retirement in 1966 Dr. Singh was unanimously elected its president. He has since continued in that office, making meaningful contribution to the Society.

The Indian Society of Extension Education started publishing its journal in 1965.

The U.S.A.I.D. helped in initiating the publication by providing financial support. It might be worthwhile to quote Dr. Kothari's comments on the U.S.A.I.D. support to the *Journal of Extension Education*:

"I was just looking into the journal and I have read the acknowledgement by the Secretary, Indian Society of Extension Education. I take pleasure in expressing our gratefulness to the United States Agency for International Development (USAID), New Delhi, for financing the publication of the

1. Castillo, G.T., "Man with Many Faces: The Researcher in a Programme of Planned Change", A/D/C paper No. 1, 1964, p. 3.

four issues of the *Indian Journal of Extension Education*."

He further stated:

"But for their assistance, it would have not been possible for the Society to bring out this useful publication on extension education. This is something I cannot understand. Are we not in a position to finance even such useful publication?"²

The Society has also organized two large-scale conferences. These conferences have lifted the image of extension education and built up the morale of its members. In addition, the first summer institute organised by the I.C.A.R. was in extension education and was directed by the present president of the Society.

Acceptance by influentials

As change agents, we know that the attitude of influentials has a tremendous impact on the acceptance of an innovation. We shall, therefore, direct our search for evidence of acceptance (at least an expressed one), on the need for social sciences in agricultural development.

While inaugurating the first All-India Seminar on Extension Research, Dr. Kothari observed:

"It is quite apparent that if we are to modernize agriculture in our country... then what is perhaps more necessary than anything else is to connect the laboratory and the field to join the farmers and scientists through various extension techniques. Now this is not an easy thing.... This is a problem that goes outside biological and physical sciences. It deals with social sciences ... This is a world problem in which the field of Agriculture Extension is a subject which is directly connected with this problem."³

Delivering his presidential address on the same occasion,

2. Kothari, D.S., "Inaugural Address, Seminar on Research in Extension," *Indian Journal of Extension Education*, Vol. 3, No. 4, 1967.

3. *Ibid*.

Dr. Pal observed:

“The Division of Agriculture Extension and the Division of Agricultural Economics are two of our very young divisions. It is a pity that it has taken so long a time to recognize its subject matter but now they are fully acknowledged to be most important particularly in an Institute of this kind.”⁴

Now let us see how the financiers—U.S.A.I.D. people, view extension. John P. Lewis said from the same platform:

“...we also welcome the additional concept that this Seminar reflects...the importance of research in extension, not Research and Extension but Research in Extension. The proposition before the Seminar is that the kind of scientific methods and investigation procedures used to find better answers in agriculture production can easily be applied to the extension process itself.”⁵

Research in extension

To those accustomed to hearing the functions of Agricultural universities or departments in India as research, teaching, and extension, the expression “extension research” might appear contradictory. This is almost like referring to a “white Rhode Island red chick” or a “white red bud tree”. It was in the year 1955, that M.C. Wilson inverted the order “extension and research” and inserted the preposition “in” and called it “research in extension” which removed the confusion.

Research in extension would study and suggest answers to questions and problems (of which we have innumerable) through the application of scientific method.

Research in extension in India started in the fifties when the Allahabad Agricultural Institute launched the J.U.P.A.N. Project. Dr. A.T. Mosher, the then principal of Allahabad

4. Pal, B.P., “Presidential Remarks”, *Indian Journal of Extension Education*, Vol. 3, No. 4, 1967.

5. Lewis, J.P., “Research in Extension, Seminar on Research in Extension”, *Indian Journal of Extension Education*, Vol. 3, No. 4, 1967.

Agricultural Institute and now the Chairman of the Agricultural Development Council, Washington, was responsible for conceiving the project and securing funds and personnel for it. This was an experimental study designed to: "(1) Compare the performance of resident village workers having different educational backgrounds and training, viz., graduates, intermediates, matriculates, constructive workers and couple units, and (2) Compare the effectiveness of four methods of approach (initial emphasis) viz., occupation (agriculture), literacy, home and family, and felt needs."

Dr. Mosher left Allahabad soon after, and the project was carried on entirely by the Indian staff. From this project have come two publications *Evaluation in Extension* and *Gaon Saathi*. Men such as J.B. Chitamber, Principal, Allahabad Agricultural Institute, A.P. Barnabas, and Dr. T.K. Koshy owe their orientation to extension and social sciences to this project. The project had several unique features. Although numerous studies with more sophisticated tools and techniques can be seen in the complete list of studies in the field of extension, none of them is a match in terms of size and practical orientation to this particular project. The project was experimental in design and emphasized on-going evaluation and providing concurrent feedback to the programme operators.

Most of the researches completed in extension are the work of Master's and Doctoral students in extension education. It is significant that there has not been a single study except J.U.P.A.N. which is a large-scale project funded by a research funding agency. However, our M.Sc. and Ph. D. students have done a good job. Much of the contributions, particularly those in methodology, have come from the I.A.R.I. Today, many institutions are becoming research-minded and there is a tendency to use more and more sophisticated instruments.

Extension has widely used sophisticated and analytical tools in its studies. In time perspective, we find three different phases in terms of the use of research methodology in extension.

Agronomic anthropology phase

In the early days when extension education was just a cell in the division of agronomy at the I.A.R.I., headed by

Dr. Raheja, most of the studies were experimental in nature, designed to find out the effectiveness of different extension methods. Experimental designs normally followed the simple agronomic trials such as randomizing block with n treatments and n replications were used. This was the only design followed in most of the Master's and Ph.D. studies undertaken before 1961, after which a change in the research trend took place.

During the same period, Sabour employed the tools and techniques commonly used by cultural anthropologists and cultural sociologists, as for example, case study, field diaries, interview schedules, record consultation, and genealogies. Most of the studies at Sabour in those days were designed by Dr. Akhour, a sociologist, who was trained under Dr. N. Prasad, now the Vice-Chancellor of Magadh University. Besides, his examiners might have had their own influence. Among others, the examiners at Sabour were the late Dr. D.N. Majumdar, Professor and Head, Department of Anthropology, Lucknow University, Dr. S.C. Dube, then Professor and Head, Department of Anthropology, Saugar University, and Dr. N. Prasad, then Professor and Head, Department of Sociology, Patna University. All these people preferred the type of tools used in the early Sabour theses.

Early quantification phase

When Dr. K.N. Singh took over as the Professor and Head of the Department of Extension in 1959 at Sabour, he laid great emphasis on sampling design and statistical treatment of data. He used several rating scales and experimental designs. He had to move in 1962 to take up his new assignment at the I.A.R.I. where he met Dr. Uday Pareek.

Psychological phase

This phase started when Dr. Uday Pareek joined the I.A.R.I. He exposed the Ph.D. students to psychometric methods and statistical treatment of data. He was an expert in research techniques and had these tools at his finger tips. His first Ph.D. student was Dr. G. Trivedi who systematically developed a scale to measure the socio-economic status of the rural

families using psychometric methods. He also factor-analysed the scale items.

Until that time, there were many critics of researches in extension. One of the criticisms was the lack of sophisticated statistical treatment of data in the studies. This criticism came particularly from economists, a few of whom were conversant with the econometric models including linear programming and production functions which were sophisticated techniques in those days. At the seminar when Trivedi presented his thesis, they realized that researches in extension were also amenable to rigorous statistical treatment.

This approach appealed to the students and it became very popular at the I.A.R.I. It is worthwhile mentioning that extension students at the I.A.R.I. were living in a "metric" atmosphere. Botany students were busy with the "biometric models", economists with the "econometric" models, and agronomists with all kinds of factorial designs. The students of other branches took pride in talking about the new research techniques, and the instruments they had mastered. Obviously, in an atmosphere like this, use of psychometric methods (in addition to its intrinsic worth) had the advantage of giving the extension boys a feeling of parity with their other colleagues. In those days (even today probably) developing a scale had become a fashion and prestige was attached to the development of scales and statistical treatment of data. Sophistication in measurement and analysis became the topic of the day. A wide range of tools and techniques were used. Singh and Deshpande (1967) in their paper "Methodologies used in Extension Research" have discussed different methods that had been used in extension in a short span of 10 years. Of course, this report is based only on a content analysis of the theses submitted in three centres – the I.A.R.I., the erstwhile Punjab Agricultural University, and the Bihar Agricultural College, Sabour – and is five years out of date. During this period, sophistication had further grown. Carrying out a similar analysis of all the theses submitted in the country would be worthwhile.

Theory building phase

This phase started when S.N. Singh, who was the rural sociologist at the I.A.R.I. went abroad for his Ph.D. in rural sociology. Dr. Singh had the advantage of having a proper orientation and pre-training motivation before going for his Ph.D. The absence of a theoretical framework had been keenly felt and he was advised to become thorough in this area. On his return to India he started advising the use of a theoretical framework which was evident in the theses submitted after 1967-68. Of course, sometimes both the scales and the theoretical framework have been overdone, and even misused. Steamrollers have been used to crack peanuts.

Theory – psychometric-and-computer phase

Around 1969, the Institute of Agriculture Research Statistics (I.A.R.S.) installed a computer. Extension students realized the value of the computer and started using it for data processing. The quantitative advance of the studies facilitated the use of computers. The latest trend seems to be the use of a theoretical framework, scales, and computers.

It seems that the extension researches, at least at the I.A.R.I., have constantly struggled to meet the following fourfold requirements: (i) developing a conceptual framework, (ii) sophistication in research methodology, (iii) use of modern data processing devices, and (iv) application of all these to the so-called "practical problems" related to rural development.

Research conference

The two major conferences organized by the Indian Society of Extension Education were on research in extension. Both the conferences proved beneficial and highly educative, aside from other significant contributions they made in creating awareness about the importance of research in extension.

The proceedings of the first seminar have been reported in the *Indian Journal of Extension*, Vol. III, No. 4. The first seminar focused on delineating the areas of research and the discussion of certain techniques and methodologies which have

the potential of application in extension research.

The second conference, held at Bangalore in 1969, had as one of its objectives a review of researches in selected areas. It also aimed at deriving action implications on the basis of the review, and suggesting pointers for future research in each area. Based on the papers presented and the deliberations at the Conference, the Society had published a 400-page book entitled *Research in Extension Education*. The book gives a good overview of the researches done in this field.

Papers based on the Ph.D. and M.Sc. theses in extension have found their place in the different prestigious national and international journals of social sciences. The papers have appeared not only in the journals of extension, but also in the journals of related fields such as sociology, social work, psychology, anthropology, soil and water management, veterinary science, etc. Acceptance of papers in leading American and international journals is a testimony of the quality of work done in some Ph.D. and M.Sc. theses. There is even more unpublished work than what is published and known.

Utilization of research

It seems that in the preoccupation with "sophistication" many of the basic questions relating to extension have been ignored. This feeling particularly arises in going through the list of questions Van De Ben has recently posed. The main questions he has raised are: (1) What should be the objectives of the extension programme? (2) How should the extension services be organized? (3) What are the effects of different leadership styles within the extension service? (4) On whom should the extension service concentrate its attention? (5) What should be taught? (6) What media should the extension officers use to know the clients? (7) How to use these media? (8) How to evaluate an extension programme? If one turns to our completed studies for finding answers to these questions one is simply disappointed. Of course, one can escape by saying that Van De Ben's questions are not applicable in the Indian context. These questions are, however, very basic, and so are highly applicable not only to India, but possibly to extension

in different parts of the world. In the struggle for establishing an identity we must accept these challenging questions. I wonder if we can afford the luxury of working on problems that are amenable to sophisticated treatment at the cost of pertinent problems that may or may not be amenable to sophisticated treatment. Of course, the ideal situation would be to work on burning practical problems with far-reaching programme implications, using the most sophisticated tools available in behavioural sciences. Are we willing and able to do it? What are the individual and environmental blocks that extension scientists experience which might come in the way of their facing these challenges? And how can national professional bodies in agriculture and social sciences help in eliminating these blocks? In my opinion, this matter deserves the committee's serious consideration.

Agricultural universities have a "high research utilitarian value". One common question asked of any researcher in an agricultural university setting is: of what use will this research be? Of course, many of our researches are of great use, but have they been used or have steps been taken to use these researches? In 1969, I mailed a questionnaire to all the heads of the departments of extension education in India regarding the steps taken by them to communicate the findings of communication research to the potential consumers. The replies were one hundred per cent negative. It is rather baffling that the work should remain on the library racks. Surprisingly, extension, which deals with promoting adoption of the findings of biological and physical sciences, could not do much by way of promoting its own findings. One important problem is to devise ways and means by which the studies can be used. The strategy of communicating the findings of extension research will obviously be very different from the strategy of communicating the findings of biological and physical sciences research to their consumers. We need to spell out what these differences are, and what the extension people must do to meet these requirements.

Some contributions of extension

Harbinger of social sciences

Extension has brought all the social sciences, except economics, to the colleges of agriculture, veterinary, and animal sciences. Under this package, subjects such as sociology, psychology, and anthropology entered the agriculture faculty. The administrative expectations from extension were that this would produce extension workers *par excellence*, probably a magician, who could get new ideas across on a "switch to adopt" basis. They did not know that this was an applied behavioural science concerned with understanding the change process.

Link between two cultures

Extension has provided a link between two cultures: the world of agricultural sciences and the world of social sciences. It is through extension that social scientists have seen their role in making agricultural scientists aware of the contributions that social sciences can make. There is an anecdote of the time that Dr. Pareek joined the I.A.R.I. Invariably his colleagues enquired of him what he was doing in an agricultural institute. Jokingly, he would say "I am studying the psychology of plants and we have a detailed plan of studying plants behaviour – things such as impact of music on yield, etc." When the interrogation demanded a sincere reply, he would smile and say: "The acceptance of new technology by farmers involves behavioural change." The role of psychology in agriculture would thus have become clear to them.

It is through extension education that the agricultural institutions have developed their network of relationships with social sciences. Many of the agricultural leaders make use of concepts from social sciences in their speeches and writings. One such person is Dr. Swaminathan himself.

Some of the behavioural sciences research technique tools have moved to the field of veterinary medicine. Illustrative of this is the use of non-parametric tests in veterinary medicine research at Hissar. Dr. Acharya, who was the statistical

consultant to both extension and medical students, came to know of non-parametric methods through extension students and later suggested it to the medical students, who found it to be useful and have since been using it.

Multidisciplinary approach

The interdisciplinary nature of researches in extension becomes evident from the wide forum in which the papers of a single thesis are published. One example will suffice. A Ph.D. thesis on communication yielded 14 papers. Of these, 8 were published in journals of psychology, 2 in journals of sociology, 2 in general social science journals, 2 in journals of social work, and 1 in a journal of education. From time to time the top social scientists have felt the necessity of an interdisciplinary approach to a given problem. We hear and read of multidisciplinary curricula and interdisciplinary seminars on specific problems. Extension has a multidisciplinary focus, though it has integrated the other fields in its own way and developed an identity of its own. As a result of the multidisciplinary training of extension students, it is common to see economic, sociological, anthropological, and psychological concepts used in an integrated manner in the study of adoption of innovations.

New fields explored

Extension education has explored new fields such as adoption and diffusion of innovations, communication of change, pattern of interpersonal communication, measurement of extension variables, problems involved in change agent – client relationship, and so on. These studies, at least in India, have been extensively done only in the field of extension education. They are now moving to programmes of health education, industrial psychology, etc. Extension can rightly take the credit for nourishing this type of study in the country.

Rural respondents

In most of these researches, the subjects have invariably

been farmers or rural people. This is very different from the traditions of research in sociology and psychology in India where, by and large, studies are done on the urban population or school students. It would be worthwhile finding out in how many of the 10,000 studies listed in the *Directory of Behavioural Sciences Research in India* the respondents have been rural people. In the words of Batten (1963), "Indian anthropologists have been mainly studying only the aboriginal tribesman, sociologists mainly life in the town and psychologists mainly intelligence and aptitude testing in the schools."⁶ Only a few touched upon farmers or farming problems. It might be added that it is far easier to work and collect data from urban respondents and students, without soiling one's shoes or undergoing any physical hardship, than it is to work with rural respondents. As soon as one tries to do rural studies, the problems become acute. A word from Castillo might be appropriate at this stage:

"Suffice it to say, therefore, that in a programme of this type, researchers' competence's need to be much more than sociological and methodological competence. He should have a pair of sturdy legs, preferably, an 'insect repellent' skin and perhaps a taste for dry fish and sardines. Willingness to use a flash light when bathroom needs arise can also make for easier adjustment to local conditions."⁷

Conversion

Extension education has converted agricultural students into social scientists who proved effective in communicating the contributions and utility of social sciences to their counterparts in other agricultural disciplines, according to the receiver's frame of reference. By virtue of the training in agriculture, and some experience in agricultural advisory service, they also had the advantage of having a good background and exposure to the life in isolated villages, which to

6. Batten, T.R., *Training for Community Development : A Critical Study of Method*, London, Oxford University Press, 1962, p. 10.

7. Castillo, G.T., *op. cit.*, 1967, p. 3.

a great extent compensated for their inadequacy in the liberal arts. Let me quote Castillo again:

"The criterion of a strong social science background proved to be a naive one, for persons expected to have this qualification had a liberal arts background with little exposure to life in isolated barriers."⁸

Speaking about the researchers with agricultural background, he says:

"The agricultural background was an asset. The many day-to-day farming activities which were puzzling to other researchers were meaningful to them. They were also better prepared to carry on in spite of the absence of plush living conditions."⁹

The conversion also leads to change from within. A "purist" comes from a different culture and is not necessarily appreciative of the culture in an agricultural institution. He has his own problems in securing entry into this system. Since extension people were changed from within, they took an edge over others on this dimension. Having received training in social sciences, they also knew when, where, and how to seek reinforcement from "purists".

Sophisticated tools and crude respondents

Though researchers in extension have worked with crude respondents and under physical hardships, they have succeeded in securing responses on the sophisticated tools of the psychometricians even from the respondents who were uncooperative. In many cases this called for a long struggle in evolving interviewing techniques so that the responses of illiterate farmers could be obtained on the sophisticated tools. Invariably, all the extension researchers who have worked with farmers have the problem of evolving some kind of interview technique. This is very different from the problems of collecting data from the sample of one's own culture.

8. *Ibid.*

9. *Ibid.*

Traditional practices

Though the need for the study of traditional animal husbandry practices has been felt by animal scientists for quite sometime and the failure of the several animal husbandry innovations have been attributed to the lack of traditional animal husbandry technology, animal scientists have never studied this aspect. One probable reason may be that a study of this nature requires a set of tools available only in social sciences. However, when the veterinarians joined the post-graduate programme in extension, they did initiate and complete several studies in this direction. These studies have raised several interesting questions for subject-matter research. If these studies are replicated over a large area, it will be possible to elicit a large number of practical, short duration research questions for the animal scientists. It is worth mentioning that the Ford Foundation Team in its report, "India's Food Crisis and Steps to Meet it" have strongly advocated the need for such studies. Obviously, planning and undertaking studies of this type require a "hybrid" researcher – someone who knows not only the animals but also the farmer. Knowing only one will not do.

Service to other sectors

Agricultural extension has provided men to man the extension departments in industrial extension and health extension. With nationalization of banks, they have also provided men for operating farm financing schemes. Many of them are also making useful contributions in agricultural input industries.

International assistance

The Indian extension men have also helped and are helping the developing countries in designing their extension services, setting up their extension departments, and conducting research in extension. Right now, approximately six persons are on foreign assignments. Many are in the developing countries.

Floor crossing

As a result of exposure to sociology and psychology, some of the extension men became so interested in these areas that they formally ended up as sociologists or psychologists. I can think of several instances. One individual, after his M.Sc. in extension, left for the U.S. and joined the Ph.D. programme in sociology and is now teaching sociology in one of the American universities. Another got himself transferred from a doctoral programme in extension to the doctoral programme in educational psychology at Wisconsin, U.S.A. Another, who after his Ph.D. in agricultural extension joined the Small Industrial Training Institute, decided to take up a post-doctoral training programme in management at Harvard. There are many others who have moved to fields such as communication, agricultural education, economics, etc. There have also been cases of reversal. Some, after their Master's degree in extension education, decided to go back to the subject-matter fields. One enrolled for a Ph.D. in veterinary anatomy and another in veterinary medicine, after his Master's in extension. These reverses may have occurred for want of foreign fellowships in extension education and their easy availability in other subjects. Also, the lack of seats for the Ph.D. programme in extension leads to withdrawal.

Those who have turned out to be psychologists or sociologists have brought a new insight into the field, and those who have reverted back have carried with them their social science training which they can apply in their new fields.

Indianizing extension

Researches in extension have "Indianized" extension. In the fifties, it was considered to be an alien subject, a "baby" of foreign aid. This impression was not unwarranted. The then professors of extension, barring a few exceptions, were using American books and were greatly handicapped in illustrating concepts with Indian data and Indian examples. The extension teachers in the seventies do not feel handicapped on this account. They have access to numerous data and examples to illustrate the concepts and approaches of extension. The use

of native illustrations relates the subject to the environment of the pupil.

During the past 15 years not only have many studies been completed, but also six text-books have been written. Of late, the Department of Extension Education, Ludhiana, has started publishing its seminar reports on various aspects of extension. Some of these reports make good undergraduate/post-graduate student reading material.

Self-image

Extension is probably one discipline in which the Indian M.Sc.'s and Ph.D.'s do not consider themselves to be what Wharton called "underdeveloped Master's and Oriental Ph.Ds". This group is very proud of its training in India. In comparison to their colleagues who have had training abroad they have found themselves better equipped.

Global leadership

Extension education was formally born in America but on account of changes in occupation and infrastructure in the country today it does not have the graduate programme in extension education on as large a scale as in India. Of course, this is both a limitation and an asset. Extension education has to come up in the African countries and in many other parts of the world. Given a little support and patronage, it is possible for extension education in India to assume international leadership. Whether it fades or it shines in the world will depend very much on what we do in the coming decade. I shall return to this later while discussing the problems of the discipline.

Day-to-day decision-making

The pressures on the general social scientists in an agricultural setting influence the quality of the decision-making bodies of these institutions. They have also proved helpful in student guidance and welfare activities. This group

provides an added insight into the students' problems in agricultural institutions.

Hidden treasure

Much useful knowledge generated by research in extension is lying unseen and unused in the unpublished extension theses, which can be found in the departmental libraries of education departments all over India. If this information is pulled out and synthesized it could provide a very useful insight into the development and change process in Indian rural society.

Problems

Goal dilemma

One major question before professors of extension today is: Are we producing extension workers, or are we turning out researchers in extension? There has been some thinking about this. The subject for the All-India Paper Reading Contest in Extension Education held at the erstwhile Punjab Agricultural University on 23 August, 1969 was: "Is the holder of the Master's degree in extension education a social scientist or a practitioner of the biological sciences?" Till recently the I.A.R.I. was the only major institution granting Ph.Ds. in extension. Among the list of the alumni of the Division of Extension of the I.A.R.I., one can spot out some who have done a good job in research. Probably these are examples of well-known persons who have excelled as extension workers or administrators. Producing researchers is the built-in characteristic of the I.A.R.I. which has been the premier research institution in agriculture in the country for nearly half a century. It has traditions of valuable research output and training in research. The atmosphere is highly charged with research. It is not surprising that the division of extension shares the macro-culture of the institute. Assuming that the I.A.R.I. decides to produce extension workers can it do so? It may not. It would be very hard to have a micro-

atmosphere which is very different from the macro climate of the Institute. An illustration in this context comes from graduate programmes in adult education in the U.S.A. While most of the universities produce adult educators, Chicago produces researchers in adult education. By and large, Chicago graduates do not do well as practitioners, though they excel as researchers. One of the directors of the Adult Education Programme remarked about one of his workers: "This guy was an A-one worker in my organization but Chicago has spoiled him. He raises a lot of questions for everything he has to do. This man has only questions, no answers." Now raising questions may be an excellent characteristic for a researcher, but it may not be a very useful trait for a practitioner in a subordinate position. The I.A.R.I. seems to be starting a new kind of programme – what they call Master's in Extension Education, with a major in agricultural development. The implicit idea is to turn out practitioners. It is doubtful though that it can turn out students with an action bias, uncontaminated by interest for research.

The two objectives seem to fall apart. The programme of study for a student who aspires to be a researcher has to be very different from the programme for one who aspires to be a practitioner or an administrator. "Two-in-one" may prove lethal. Of course, Ph.D. is a research degree and so it should aim at improving the research competence of its recipients, but this is not true for the Master's degree and, therefore, the dilemma is particularly true for the Master's programme.

Problem of structure

A degree in extension calls for competence in the core area of extension as well as a thorough training in its allied fields. The problem is how much emphasis to lay on allied fields and on which allied fields. Should the minor be in the agricultural sciences or should it be in one or more subjects from the allied fields of social sciences?

Nomenclature

The term "extension education" tends to be very confusing.

It does not sound like a discipline. I wonder if it would be desirable to change to a name which is more academic. The tendency in the departments of extension education in the United States now is to change their name to "Adult Education", keeping the context almost the same. This change will not be useful in the Indian context.

Mushroom colleges

Extension needs family planning. One of its misfortunes is that too many colleges are turning out too many students, with too many limitations. Even institutions that are hardly equipped to do justice to undergraduate teaching in extension education are turning out 15 to 20 M.Sc.'s per year. Surprisingly, the number of "underdeveloped" Master's per year might be approximately twice or even thrice the number coming out from the well-staffed and equipped institutions. As bad money drives good money out of the market, so would poor products drive out the good products from the employment market. Their intolerable performance in the employment interviews has given a bad image of the discipline to the employers. I wonder, if there is anything that can be done in this regard. The I.C.A.R. is very keen to improve the situation, but it has so far proved ineffective. In the course of an official inspection, the Additional Director General (Education), I.C.A.R., was shown a number of almirahs full of extension theses in one of these colleges. When the A.D.G. asked as to how many notes (not full research papers) have appeared on the basis of these theses, the reply was that none had. This is not all. In one of the M.Sc. examinations, the majority of the students could not name five books on extension education and five journals useful for extension students.

Acceptance

While extension education has far greater acceptance today than ever before, this problem still continues. Neither social scientists nor administrators seem willing to recognize it. In the Indian Science Congress, there is no section – either within agricultural sciences or among social sciences – on extension

education. The long list of the I.C.A.R. research projects is conspicuous by the absence of any project on extension education. Further, within the I.C.A.R. although there are various cells, and deputy director general and assistant director general for various disciplines, there is none for extension education. The Indian Council of Social Science Research does not have a representative from extension education. Obviously, this subject remains unrepresented in research funding bodies. At times, even agricultural economists have been antagonistic to extension. Some of the most bitter criticisms on extension has come from them. The following passage taken from the presidential address by Prof. V.M. Dandekar, Director, Gokhale Institute of Politics and Economics, Poona, on the occasion of the 20th Annual Conference of the Indian Society of Agricultural Economics held under the auspices of the Punjab Agricultural University, Ludhiana, will illustrate this point:

“There is a new variety of extension men we are now training in the universities. They need know even less of agricultural technology and farm economics. They are masters of extension as such. Hence, their expertise is mainly in sociology, psychology, social psychology, educational psychology, group dynamics, leadership structures, motivational patterns, and several other luxuries. With so much sophisticated extension education, I am afraid, they will have little to extend except themselves.”¹⁰

Lack of foreign aid

Extension education is neither receiving nor can it receive, foreign aid. By foreign aid, I do not mean only the financial aid but even the intellectual support which is available to other disciplines. To take an analogy from the field of plant breeding, extension education is pulse and not wheat. A great deal of research is conducted in wheat in the developed

10. Dandekar, N.M.; “Planning in Indian Agriculture”, Presidential Address delivered on 26th Annual Conference of Indian Society of Agricultural Economics, *Indian Journal of Agricultural Economics*, Vol. 22, No. 1, pp. 7-23.

countries of the world and Indian breeders legitimately take advantage of these investigations. On the contrary, India is the only major pulse growing country and, therefore, new vistas in pulses have to be explored exclusively by Indian resources. The position of extension is even worse than that of pulses!

For pulses there is at least a feeling of urgency and demand and support from the clientele and administrators. In extension even this is missing. Lack of demand and support from administrators and of funds from the funding agencies, a handful of workers in the country have to generate and sustain their own motivation for useful contribution. This should not be misinterpreted as an expression of dependency by a person who has grown up in a period when the country was leaning heavily on foreign aid. Although this has many disadvantages, we also consider it to be an opportunity. Since Americans are not miles ahead of us in the field one can develop the discipline right here in India and make it a model for others to emulate. What is still more important is its potentiality to develop entirely on Indian resources. Fortunately, it does not require imported instruments. Further, there are good and capable men available in the allied fields of extension education. I think it is possible to achieve much more in India in the field of extension education than in any other field. The problem is of providing some internal visiting professors, funding a few research projects, and granting a few fellowships.

Affiliation problems

Every professional body ultimately seeks affiliation to an international body. Unfortunately, there is no international body in the field of extension education. The American extension scientists have affiliated with adult education which of late has started an international journal and is possibly on the way to holding an international congress. This limitation of extension is again an asset in a way. India has all opportunities to go ahead and organize a body such as this. Fortunately, of late, post-graduate teaching in extension has started in several countries such as Nigeria, Lebanon, and the U.K. At one

time we had tried to prepare a directory of institutions teaching extension education in undergraduate and post-graduate classes in agricultural colleges around the world. Like many other things, we left the work soon after initiating it. If this directory is completed, it will be possible to initiate intra-group communication across the world. By initiating it, India would be taking the lead. I might add here that Queensland, the first university in Australia to have a post-graduate programme in extension, was anxiously looking for a suitable man from India.

Job opportunities

Till recently, the feeling was that there was a dearth of personnel who were specially trained in extension education. Now the problem seems to be more of a glut than of scarcity. We are now producing persons with a Master's degree at the rate of about 100 a year. A handful of these go on for doctoral work, a similar proportion enter teaching, and a handful find entry into industry and business. The large majority represents a great question mark for the profession. As a matter of fact, we should look into the employment pattern of the post-graduate alumni of different extension education departments of the country and compare the situation with respect to the different disciplines in agriculture and different branches of social sciences. One can ask if this problem is just a reflection of the overall unemployment problem of the country or if it is something that is specific to extension? Of course the problem is that the various positions for which these people are specifically suited are not reserved for them. The jobs which are particularly suited to the extension people comes under the "open" quota. This means that anyone with a Master's degree in agriculture can compete for the position. It would be interesting to find out the number of positions for which Master's in extension are most qualified. The position for which they are most suited is that of Block Development Officers but somehow this job has been kept under the "open" quota. While we need a specialization for the rearing of animals and tending of forest plants, we do not have any specialization for bringing change in human behaviour, knowledge, skills, and attitudes. Though

every extension man feels bad about it no one has taken up the matter in earnest with any State government. The extension scientists have remained busy with finding out ways and means of promoting adoption of agricultural technology. They have not been able to devise ways and means for promoting adoption of their own discipline.

Lack of theory

Another problem that bothers the extension researchers and teachers is the lack of a sound theory in extension. Of late, this has been more acutely felt. On the international plane an attempt was recently made by John Tully to present a sociological theory of extension but this is just a scratch on the big surface. A theory building project for extension is something which is urgently needed. Even assuming that nothing comes out of it after one year of effort, the beginning made in this direction will at least provide a lead.

Problem of consultancy

Consultancy, in this field of agriculture, is an alien concept. Though it has helped other areas to a large extent it is almost completely missing in the agricultural university setting. The extension people suffer because of this in two ways. On the one hand they are deprived of taking on consultancy work and on the other, in view of the stigma attached to it, they dare not keep a provision for consultants on their own research projects. If a consultant is employed on a research project they are likely to be asked whether they are not capable of managing the project on their own. The provision of a consultant is viewed either as a collusion on the part of the client and the consultant, or as dependency on the part of the client.

Role conflict

There seems to be an enormous gap between what extension scientists in a university feel they should be doing and what their employers feel they should do. Among these also, different persons have different expectations. Possibly, of all the

people in the agricultural university setting the extension man is the worst victim of a role conflict. The least expected job from him is research extension. The most expected and rewarding job for him is carrying out public relations functions for the university, organizing and conducting training of students in speech and writing, setting up of exhibitions, organizing villages for the students, etc. In several agricultural universities, scope for research is completely missing. On the other hand, the youngsters feel that they should devote more time to research. However, even highly motivated research workers find it difficult to satisfy their research urge because they are normally loaded with so many miscellaneous activities that they find hard to squeeze in time to conduct a satisfactory research project.

The myth of the practical graduate

Nothing has done more harm to the cause of agriculture education and extension education than the concern of the leaders in the field to turn out what they call "practical agricultural graduates" without knowing what constitutes a practical agricultural graduate. The definition of a practical agricultural graduate varies from person to person. If the extension men see this as amenable to investigation, they are laughed at. In their concern for producing the so-called "practical graduate", the administration also expects practical training in extension. Of course, extension professionals do not disagree that the training should be practical, but the clash comes with regard to the methodology. The problem with the administrator is that he also claims to know the methods of giving practical training and wants to impose it upon the extension professionals. As a matter of fact, this becomes a problem for the extension teacher. In what manner can the practical training be given? Many of the training techniques used in management education can be used here. Recently Singh and Laharia (1971) have examined this point and raised several questions. A seminar on "Teaching Extension", dealing with the methodological aspects of resident extension teaching is very necessary. At Hissar some attempt was made to use incidents, cases, role playing, and exercises in extension teaching. But they could not go ahead, for

want of more teaching material. They have had to develop these materials, among other things. If these techniques have to be used in extension teaching, then someone has to develop these teaching materials. Who is going to do it?

Research utilization

Agricultural universities perform three functions – teaching, research, and extension. Extension is meant for promoting the utilization of researches. But how exactly can researches in extension be utilized? What is puzzling is that not many people are worried about this aspect. Some good examples of utilization of extension research are provided by Haryana Agricultural University, Hissar. In some cases of utilization, however, the producer was the consumer or the consumer was the producer's colleague. This is not likely to be the situation in many cases. Of late, some of the universities have instituted the positions of "Extension Specialists". Though these specialists have been employed for communicating the research findings of their areas, they are often busy performing various managerial functions.

Misunderstood and "overstood"

The "significant others" in these settings do not understand the role of research in extension and after a great deal of struggle, when they start visualizing the role, they immediately "overstand" and start asking "Why should you do this? Why should a sociologist, psychologist, or anthropologist not do it? The question is not whether others can or cannot do it but whether they have done it in the past or will do it in the future. Of course, the tools and techniques are common to all the social sciences, but this is also the case in the biological sciences. Name any branch of biological sciences that does not use a microscope.

In spite of all these blocks and impediments, extension has made headway.

Agricultural economics

As stated earlier, among all the social sciences currently taught in the colleges of agriculture, agricultural economics is the oldest. The exact mode of entry is not known. At the undergraduate level, this subject has been taught for a long time. Interviews with key-informants available in the country can help us to construct the historical background. Today there are approximately 30 institutions which offer M.Sc. programmes in agricultural economics. Nine institutions : (1) I.A.R.I., New Delhi, (2) Punjab Agricultural University, Ludhiana, (3) U. P. Agricultural Institute, Pantnagar, (4) Haryana Agricultural University, Hissar, (5) University of Agricultural Sciences, Bangalore, (6) Jawaharlal Nehru Krishi Mahavidyalaya, Jabalpur, (7) U.P. Institute of Agricultural Sciences, Kanpur, (8) Banaras Hindu University, and (9) R.B. College Agra, have also Ph.D. programmes in agricultural economics. Approximately 200 M.Sc.'s and 8 Ph.D.'s are produced every year.

It is significant to note that the research and teaching in agricultural economics started outside the faculty of agriculture. Some pure economists became interested in agricultural problems and started making intensive studies in this area. Thus over a period of time they became known as agricultural economists. The early agricultural economists such as Nanavati, were economists working outside the agricultural institutions. Other evidence that agricultural economics was not patronized in the old agriculture colleges is provided by the leadership pattern in the field of agricultural economics. Most of the men who matter in agricultural economics are outside the agricultural faculty. The composition of the Executive Committee of the Indian Society of Agricultural Economics also reflects the position of agricultural economics in agricultural institutions. In the Executive, there are only two persons who belong to the agriculture faculty. In its history of 32 years, the society has had only one person (Dr. A.S. Kahlon) from the agriculture faculty as its president.

Curriculum

Agricultural economics is an integral part of the core

curriculum of B.Sc. (Animal Science) and B.Sc. (Ag.), and also of a small minority of the curricula of veterinary colleges. Four courses of 12 credit hours are compulsory at the Punjab and Haryana Agricultural Universities. The position is almost the same at other agricultural universities and colleges. In the colleges which work under the traditional system, there are two papers in agricultural economics. The College of Veterinary Medicine, Hissar, is probably the only one which has one credit hour of economics. This was probably introduced in response to persistent persuasion by Dr. A.S. Kahlon, presently the Dean, College of Basic Sciences and humanities, Punjab Agricultural University, Ludhiana. Most of the agricultural universities have provided scope for electives in agricultural economics at the undergraduate level.

There is evidence of modernization of the post-graduate curriculum. By now most of the institutions, including some of the colleges that have recently mushroomed, have incorporated quantitative analytical tools such as linear programming and production functions.

Acceptance

While Agricultural economics is supposed to be better accepted than extension education it has its own teething problems. Neither the I.C.A.R. nor the Ministry of Food and Agriculture has a cell on agricultural economics. The I.C.A.R. has an additional director general for almost all the subjects except agricultural economics and extension. A casual remark by one of the key persons in the I.C.A.R. makes a good attitudinal statement: "Anyone with a sharp pencil can become an agricultural economist." However, all the agricultural universities have positions for a full university professor in agricultural economics.

Regarding their position among economists there seems to be a hierarchy among economists of different shades. The "purists" look down upon agricultural economists regardless of their belonging either to the agriculture or the arts faculty. Among the agricultural economists also, those who are outside the agriculture faculty tend to rate themselves superior to those in agriculture. It is interesting to note that in the whole history of the Economic Society of India, Dantwala is the only

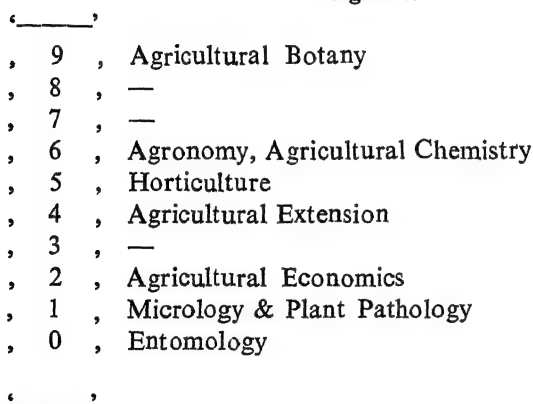
agricultural economist to have been elected its president, and that too only three years ago.

Now that most of the agricultural universities have a full position for an agricultural economist as well as a Ph.D. programme in agricultural economics, it would be interesting to find out the proportion of their research contribution every year as compared to those who are outside the agriculture faculty and those who are not agricultural economists. Data on the consultation frequency of individual economists by decision-making bodies might be another indication in this regard.

Two studies can enlighten us on the popularity of the post-graduate programme in agricultural economics. In the study by Pareek, Kumar and Jain, economics was third from below.

The composite preference scale value of different subjects as derived in this study are given in the figure below:

Figure 1



Similarly, in Kaul's study, agricultural economics was closely above agricultural extension. The scale values (mean $+ .649$) of the two were extension (000) and agricultural economics ($.435$). In this case, among all the subjects, agricultural economics was third from below and extension was the last. Even in the utility perception of different segments of the agricultural curriculum, agricultural economics was the last but one.

Of late, the Ford Foundation has launched a project on "Maintenance of Farm Records by Farmers in I.A.D.P." This

is the first large-scale extension application of agricultural economics.

Contributions and trends

What exactly have the agricultural economists in agricultural universities done so that their achievement can be singled out from that of others? This is an important question. The trend in the agricultural faculty which is different from others has been the emphasis on micro studies rather than on macro studies. The agricultural economists have been more concerned with the study of input management at the individual farm level.

Students

Since agricultural economics has been taught in the agricultural faculty for the past 20 years, it is time to focus on the alumni. We find at least two front-line agricultural economists were contributed by agricultural colleges.

Research trends

One significant change in agricultural economics within the agricultural setting has been the switch over from descriptive studies to Quantitative techniques. In the fifties there were a few persons familiar with linear programming and production function. Today, this is an integrated part of the M.Sc. economics syllabus. The aspiration seems to be in favour of more and more quantitative models. However, it might be mentioned that some of the recent quantitative models such as (1) game theory, (2) simulation model, (3) quadratic programming and (4) recursive programming have not yet found their place either in the curriculum or in the research reports put forward by this group. Of course, in one Ph.D. thesis, recursive programming has been used but a few agricultural economists feel that this is a distorted application of the technique. The objective appraisal of this conflict can be done only by economists highly proficient in quantitative models. A few faculty members in the Department of Agricultural Economics, Pantnagar, who have recently returned from the U.S.A. have come with thorough

preparation in these four techniques. Recently, Dr. Johal, Professor of Agricultural Economics and Rural Sociology, was at the Ohio State University for one year as Visiting Professor of Agricultural Economics. To the best of my knowledge, possibly, he is the only economist from the agriculture faculty who has ever been on this kind of assignment with a foreign university.

Rural sociology

Rural sociology entered with extension and this position continues even today in all except one agricultural institution. However, in the year 1965, the Department of Agricultural Economics of the erstwhile Punjab Agricultural University enlarged its nomenclature and called itself the Department of Agricultural Economics and Rural Sociology. They recruited a few sociologists and got the existing ones working in the Department of Extension Education transferred to the Department of Agricultural Economics and Rural Sociology. The rural sociology cell, headed by Dr. Madan Lal Sharma, started an M.Sc. and a Ph.D. programme four years ago at Ludhiana. At the time of this writing, about half a dozen students have completed their M.Sc. in rural sociology and none have completed the Ph.D. The first student admitted to the Ph.D. programme at Ludhiana will soon be completing his thesis and will get his degree from the Haryana Agricultural University. For some time, there has been a controversy on the location of rural sociology at Ludhiana. The Departments of Extension Education and of Agricultural Economics claim this cell. The rural sociologists on the other hand demand an independent department for which they have struggled persistently but with little success so far.

With the bifurcation of the erstwhile Punjab Agricultural University, the Head of the Sociology cell at Ludhiana, moved to Hissar with the single Ph.D. student who was a faculty member at the Hissar campus on deputation for his Ph.D. at Ludhiana. Since the Hissar campus did not have any position in rural sociology, the immigrant was adjusted against a position in extension education. The one-man-sociology-cell, on its arrival

at Hissar, continued its struggle for the independent status of the Department of Rural Sociology and as a first step, instituted an M.Sc. and a Ph.D. programme in the subject. In 1970, two students were admitted to the M.Sc. in rural sociology (one later left) and one to the Ph.D. The question of the exact location of rural sociology in the organizational structure is still under the consideration of the Academic Council of the Haryana Agricultural University. A similar proposal is also under the consideration of the decision-making bodies of the Andhra Pradesh Agricultural University.

Problems

In the short duration in which rural sociology has come to stay as an independent cell, not much can be expected. Of course, it has its problems. It has all the problems that extension education has plus many more. In its present situation it has more liabilities than assets. Career opportunities for a Master's in rural sociology still present a big question mark before the advocates of social sciences in these settings. Agricultural universities have a history of operating job oriented courses and the discipline which does not offer good job opportunities will find it hard to stand and grow.

Problem of living together

Expansion of social sciences in these universities has also created some problems of living together. Over the years with long association, extension and economics were in a position to settle their boundaries and decide their relationship to each other. Now comes rural sociology, which at times creates the problems of jurisdiction jealousy. All the applied courses of rural Sociology tend to be very similar to that of extension, and, therefore, the question comes up as to where these courses should be listed. There are quite a number of common courses. Some common areas are: adoption and diffusion of innovations, social action process, rural leadership, research methodology, etc. These causes are claimed equally by extensionists as well as the rural sociologists. Similarly, various research areas are common between the two disciplines. This is evident from

the nature of studies completed in the Departments of Extension and Rural Sociology at Ludhiana. Extension people have demanded more basic courses on thoughts and theories from rural sociology and sociologists have been more keen to hold the applied fields. A convention has to be developed so that relationship between the two becomes symbiotic.

Surprisingly, some of the social scientists who are valued very much in the field of extension education are those who have tried to enrich extension education by transplanting their tools, techniques and theories in extension instead of attempting to build up their own empire by pushing it off the line. This observation is significant for promoting, strengthening and consolidating the teaching and research of social sciences other than agricultural economics in agricultural universities.

ANNEXURE I

Old Punjab University Syllabus in Agricultural Extension for B.Sc. (Ag.)

PART I (50 marks)

1. National Extension Service and Community Development in India—meaning, nature, scope, aims and objectives.
2. Rural Welfare movement in India; concept of welfare state; democratic socialistic pattern of society; a historical review of the past experiences in rural uplift work serving as a basis for the evolution of current programmes (purpose, scope and critical appraisal of such projects as Gurgaon, Wardha, Santiniketan, Marthandam, Grow More Food Campaign, Etawah, Pilot Extension Projects, etc.).
3. The organization of the extension service in India. A detailed study of (i) N.E.S. and C.D. staffing pattern at different levels; (ii) Role of beneficent departments in Community Development.
4. Role and functioning of professional Extension Workers, Gram Sewaks-Block Level Extension Officers, Block Development Officers, etc.
5. Philosophy and principles of extension.
6. Extension teaching—meaning, nature, purpose of extension education; extension teaching process and principles; extension teaching methods—their characteristics and relative effectiveness.
7. Programme planning—meaning, nature, and scope of programme planning; steps in programme planning; principles of programme planning.
8. Extension evaluation—meaning, importance.
9. Role of valuatory and autonomous institutions, such as Cooperative Panchayats, Bharat Sewak Samaj, in programmes of community development.

PART II (30 marks)

1. Rural Sociology – definition, scope and its relationship to other social sciences like economics, sociology, anthropology, psychology, etc.

ANNEXURE II

List of Post-graduate Courses in Extension Education in two Universities

Udaipur

1. Extension Education and Community Development
2. Educational Psychology for Extension Workers
3. Group Dynamics and Leadership
4. Evaluation in Extension Education
5. Extension Programme Planning
6. Administration and Supervision in Extension Education
7. Rural Sociology for Extension Workers
8. Community Process
9. Extension Research
10. Advanced Techniques of Research in Extension Education.
11. Principles and Process of Training
12. Adoption and Diffusion of Innovations
13. Recent Trends in Extension Education
14. Psychometric Methods in Extension Education
15. Principles and Practices of Adult Education
16. Seminar
17. Research

Haryana Agriculture University, Hissar

1. Introduction to Extension Education and Community Development
2. Extension Methods and Programme Development
3. Introduction to Extension Education
4. Communication Process
5. Dynamics of Agricultural Development
6. Agricultural Journalism

7. Salesmanship
8. Audio-Visual Aids
9. Credit Extension
10. Extension Education and Community Development
11. Programme Planning
12. Administration and Supervision
13. Working with Rural Youth
14. Demonstration and Group Methods
15. Community of Agriculture Technology
16. Extension Psychology – I
17. Extension Psychology – II
18. Evaluation and Research
19. Problems of Extension Administration
20. Measurement in Extension Research
21. Advanced Research Techniques
22. Theory and Practice of Training
23. Dynamics of Planned Change
24. Comparative Extension
25. Seminar
26. Special Problems.

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POSITION OF SOCIAL SCIENCE TEACHING IN ENGINEERING COLLEGES OF INDIA

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AN ATTEMPT is made in this paper to describe the present position of social sciences in engineering colleges and institutes in the country. The material for the paper has been derived from various sources, viz. case studies of different types of engineering colleges in the country, personal impressions which the author formed while working in an engineering institution, published documents such as annual reports, and course curricula of a few engineering institutions. In addition, factual information as obtained through a questionnaire filled out by 33 teachers of 25 engineering colleges located in 12 States has been incorporated. The details of the questionnaire are described in the Appendix. The respondents had come to the I.I.T. for taking part in summer courses in 1971.

The plan of the paper is as follows:

1. A brief historical resumé showing the main stages in the growth of social sciences in engineering institutions.
2. A summary of objectives and contents of social science courses for the country as a whole.
3. Social science faculty and their problems.
4. Some case studies giving details of social science courses, faculty and facilities in typical engineering institutions in the country.
5. Social sciences as recommended for Regional Engineering colleges.

1. A brief historical resumé

Very little is known regarding the precise date from which and the manner in which the teaching of social sciences in engineering institutions started in the country. Prior to 1951 the engineering institutions in the country, some of which are very old and established, were of the nature of State engineering colleges. These colleges did not seem to attach any importance to the teaching of social sciences *per se* to engineering students. Hence they did not have any department of social sciences and few had regular social science faculty on their pay rolls. The only social science subject being taught was economics of which one or two courses were taught. The contents of these courses included those aspects of economics which were regarded as directly useful for the professional competence of engineers, and included topics such as costs, wages, industrial relations and industrial organizations, etc. These were usually taught either by the engineering faculty or by part-time teachers from local arts colleges. There seems to have been little expansion of social science faculty and teaching in these institutions, though with time and as a result of developments taking place after 1951 (described below), some of the colleges introduced a few other subjects such as industrial psychology and industrial management and established a separate department of humanities, including social sciences, as for example, at the Roorkee University. The newly established State engineering colleges have given more importance to social sciences than the old ones, for instance, M.I.T., Muzaffarpur, B.V. Mahavidyalaya, Anand, Thaper Institute at Patiala. But even now, social sciences other than economics and management are taught in very few of these institutions.

The year 1951 is significant in the history of engineering education in the country. In that year the Government of India, in pursuance of a plan submitted by the Nalini Ranjan Sarkar Committee (1946), established the Indian Institute of Technology at Kharagpur, thus giving a new dimension to engineering education in the country. In 1956, Parliament enacted the Indian Institutes of Technology Act, which, among other things, provided for a separate department of humanities for teaching humanities and social sciences to undergraduate engineering students. I.I.T., Kharagpur, made pioneering attempts to estab-

lish a good base in the social sciences, particularly psychology and economics. It recruited some promising young social scientists and gave them respectable academic ranks. Apart from teaching undergraduate engineering students, a one-year post-graduate diploma course in industrial psychology and industrial relations was also started and is still in existence.

Following the success of the I.I.T., Kharagpur, the Government of India established four more I.I.T.s, namely, Bombay (1958), Madras (1959), Kanpur (1960) and Delhi (1969). Since all these Institutes followed the same I.I.T. Act, they each established a department of humanities and social sciences. The Act, however, did not provide any details about the number and type of courses and the type of faculty needed for this purpose. This was supposed to be determined by each Institute for itself. As a result, there is much variation among the I.I.T.s regarding the status of social sciences. Generally the ideas and views of the Director of the Institute have played an important part. All the I.I.T.s, however, are different from the old established engineering colleges under State governments in the sense that they provide a richer content and variety of social science education and have more competent social science faculty with better facilities. In some of the Institutes, for example, at Kanpur, social sciences occupy an important position. Since the mid-sixties the Indian Institute of Technology, Kanpur, has been developing its social science teaching to the extent that it has now become an important centre of social science education and research in the country. Much of the credit for this goes to Dr. P.K. Kelkar, the first Director of the Institute, Dr. R. Prasad, Professor of Philosophy and the first Head of the Humanities Department, and to the Visiting Professors from the American universities associated with the Institute in its early days. The social science programmes at Kanpur were further consolidated and expanded during the early seventies resulting in an increase in the number and quality of social science faculty, extension of the Ph.D. programmes in new areas, formulation of a master's programme in economics, a substantial increase in the number of Ph.D. students in social sciences, expansion of research activities, and a greater variety of social science courses.

The fifties and the sixties were characterized by a rapid

growth of engineering institutions in the country to meet the requirements of trained personnel for manning the development projects. Apart from the I.I.T.s, the other institutions established during this period were the Regional Institutes of Technology and the engineering colleges established by State governments, so that by 1972 there were 130 engineering colleges and institutes in the country. In accordance with the decisions made by the Government of India in 1958 and 1960, 14 regional engineering colleges (or institutions) were established, one in each of the major States, during the period 1959-1964. One more (15th) is being established in Silchar in Assam. Following the pattern of the Indian Institutes of Technology, all these colleges have a separate Department of Humanities consisting of English and one or more of such subjects as economics, philosophy, psychology, sociology and history. There is, however, substantial variation regarding the extent of social science teaching. Economics is the only discipline found in most engineering colleges. The state engineering colleges established during the fifties and the sixties have also paid more attention to the teaching of humanities and social science subjects compared to the earlier institutions. Thus we can say that it was primarily during the fifties and the sixties of the present century that the social sciences found their way to the engineering colleges in the country. The process is continuing in the seventies.

However, there is much variation regarding the position of social sciences in these institutions. An important reason for this lies in the fact that professional contacts between social science faculty of different engineering institutions have been almost non-existent. Each institution works in isolation.

The Indian Council for Technical Education, the supreme body for providing guidelines for engineering education in the country, does not seem to have paid much attention to this problem. Recently, views have been expressed at the Council meetings on giving more emphasis to the teaching of economics and management to engineering students. However, there is not much evidence of a systematic and detailed approach to this question. The Council is still in the process of defining the major objectives of engineering education in the country. It is only after this that the Council will be in a position to

examine the role of social sciences in engineering education.

In 1971 the Government of India appointed a Committee to review the working of the regional engineering colleges and to make recommendations for their future growth. The Committee submitted its report in February 1974. Along with other subjects, the Committee has also submitted recommendations on the teaching of social sciences in these institutions (included here under Section 5).

As per the decisions of the I.I.T. Council, every I.I.T. has appointed a Review Committee for reviewing the humanities and social science courses, the faculty, etc., in the concerned I.I.T. This work is still in progress and reports are not available as yet.

2. Objectives and contents of social science courses

There could be two reasons why social science courses are included in the engineering curriculum. (1) Social science courses give a broad and general education to engineers, make them aware of the various social problems and in this way add to their general education and increase their effectiveness as responsible citizens. Such courses may have no professional utility in the narrow sense of the term. Examples of such courses could be a course in human civilization or political ideas. (2) Social science courses cater to the professional needs of engineering students, e.g., courses on managerial and engineering economics, industrial psychology, industrial sociology, business management, and so on. This knowledge is useful to the engineer in the discharge of his professional responsibilities as production manager, design engineer, planning officer, etc.

The relative importance of these two approaches differs from institution to institution depending upon its educational philosophy and resources. As indicated by our survey (referred to above), most of the State and regional engineering colleges have adopted the second approach. Only such social science courses as are directly relevant to the professional training of engineers are taught to students. Economics in general, and engineering economics in particular, is taught in most of the colleges. Industrial management is another such course. Indus-

trial psychology is also taught in some of the colleges. Barring a few exceptions, other social science courses are not taught at all. Thus, among the social science subjects, economics alone has been able to find a place in the engineering curriculum. This is not surprising in view of the close relationship between economic analysis and engineering studies. Recently there has been an increase in the emphasis on providing management education to engineering students. This is likely to provide more scope for the teaching of social science subjects since these provide the base for management education.

About two economics courses, each of two to three contact hours per week, are offered. These are compulsory courses. Thus the proportion of social science courses to all the courses that a student takes is extremely low. The level of the courses is rather elementary. It can be compared to the Intermediate or at best to the B.A. (pass) standard of arts colleges. The course contents generally include most of the topics under a discipline as can be seen from the case studies cited below.

The pattern is different at the Indian Institutes of Technology. There social sciences and humanities courses are designed to also give a broad and general education to engineers, despite the fact that they may have no professional relevance. The number and variety of social science courses are also much greater than in other colleges. Apart from economics, other disciplines such as psychology, political science, history and sociology in varying mix are also given. The level of the courses is advanced.

3. The social science faculty and their problems

The position with regard to faculty is quite varied. All the I.I.T.s, R.I.T.s, and some State engineering colleges, e.g., those at Kakinada, Muzaffarpur, Anand, Nagpur, Patiala, Coimbatore, have separate humanities departments which often consist of faculty in English, and in economics. The average size of the social science faculty is two. In some State colleges, as for example at Guindy, Madurai, and Indore, the one or two faculty members in economics (and the same is true of English also) are also attached to other departments such as mathema-

tics or mechanical engineering departments. In others, economics and other social science subjects, if any, are taught by part-time teachers drawn from local arts colleges as at Trichur and Hyderabad. In a few university departments of engineering, as for instance at Chandigarh and Annamalainagar, the services of teachers from the university department of the concerned social sciences are utilized for this purpose. Lastly, in several colleges, the social science subjects are taught by the engineering faculty themselves, as at Hyderabad, Warangal, and Trivandrum.

One of the main problems facing the social science teachers working in engineering colleges is that of professional recognition. The professions, being dominated by the university departments and arts colleges, tend to ignore the existence of these teachers. Faculty of similar qualifications employed in arts colleges get certain recognition and privileges which are denied to teachers in engineering colleges. The U.G.C., the State governments, as well as most other such agencies, send their communications regarding matters pertaining to social science subjects to social science faculty in arts colleges and not to those in engineering colleges. Another problem is that of academic isolation. One or two faculty members in a college do not make a viable academic team necessary for intellectual collaboration and professional growth. A third problem is that of status. In general, the humanities and social sciences are considered less important for engineers both by students and by the authorities, with the result that the social science subjects generally occupy an inferior status in most of the colleges. Superior posts in these subjects are generally not available. Moreover, there is little professional link between the social science faculty and the engineering students whom they teach. Hence the existing social science faculty in most of the engineering colleges do not derive the same satisfaction as their counterparts do in arts colleges. In addition, opportunities for professional advancement are limited on account of inadequate library facilities, and non-availability of Ph.D. programmes for improving their qualifications while working.

4. Some case studies

As already pointed out, there is a wide variation in the level and content of social science courses as well as in the organization, number and quality of social science faculty. It is, therefore, more appropriate to look into the experience of different types of institutions. Below are some details regarding the status of social sciences in some representative institutions:

- (1) A State Engineering College
- (2) An Engineering University
- (3) Regional Engineering Colleges
- (4) A Specialized Engineering Institution
- (5) The Indian Institutes of Technology
- (6) The Indian Institute of Technology, Kanpur
- (7) An Institute deemed to be a University

4.1 *A State engineering college*

This is one of the oldest engineering colleges in the country. It was under the direct control of the State government till 1952 when it was taken over by the university. Its management is again to be vested in the State government. It is financed by the State government. Initially the college had graduates only in civil engineering. Later, electrical and mechanical engineering were added. Civil engineering, however, continues to occupy a dominant position.

The college provides a 5-year integrated course leading to the B.Sc. degree in engineering. Among the various courses, only the following three can be regarded as belonging to the social sciences. All these are university examination courses. The detailed course outline is also given below:

(i) A general course containing certain aspects of Indian social and economic life, taught in the third year. The class meets twice a week.

(ii) A course on economics of engineering and accounts, taught in the fourth year in all the three branches of civil, electrical and mechanical engineering. The class meets twice a week.

(iii) A course on industrial management taught in the fifth

year in electrical and mechanical branches only. The class meets thrice a week.

There is no social science department in the college and no faculty member with specialization in the social sciences. The social sciences mentioned above are taught by the engineering faculty.

The college, being an old one, has been functioning on the basis that only those courses which have immediate professional relevance should be taught to engineering students. The social science courses mentioned above belong to this category.

The Principal and the staff members of the college feel that the teaching of social sciences should be assigned a more significant position than it is at present and that there should be social science faculty for teaching the social science courses. They have, however, pointed out the difficulty of obtaining the extra faculty positions and of attracting competent social scientists to an engineering college.

The college library has an adequate number of books on all the social science topics which are taught to students. The books had not been used for the past several months as could be inferred from the heaps of dust accumulated on them. The library subscribes to a few Indian magazines in the field of economics. The university library is nearby so that there is no problem of the availability of reading material.

Extracts from the syllabus (Third Year)

HUMANITIES (SOCIAL SCIENCE)

1. *The Land and People of India* – Geographical setting, the people, Indian characteristics of life, the birth of Indian Democracy, the Indian Constitution, Indian Union and State Governments, Legislature, Citizenship, United Nations Organization, Capitalist, Democratic, Socialistic and Communist institutions.

2. *Defence* – Policy, Organization, Services, Defence research, Civil defence, N.C.C., the National emergency.

3. *The Community* – Population, Religion, Social Welfare, Technical Education, Organization of Scientific and Technological research, Researches in Government departments, Industry and Technical Institutions, the Learned societies, Role of Engineering in the modern society.

4. *Industrial Kevolution* – Study of development of modern industry, its impact on society, relationship of technological development to social progress.

5. *History of Planning* – Development plans in other countries, Principles of National Planning, Growth of National Planning in India, The Five-Year Plans.

Book for reference: *Facts about India* – A Government of India Publication.

HUMANITIES (ECONOMICS OF ENGINEERING AND ACCOUNTS) (FOURTH YEAR)

(a) *Humanities*: Labour recruitment, Factory labour organization, Methods of remuneration, Trade Unions, Strikes and Lockouts, Government control of industries.

Labour legislation and laws relating to engineering industries. Maintenance of effectiveness of workers. Industrial fatigue, its removal, industrial diseases, health administration, protection of women and children.

(b) *Economics of Engineering*: Money, capital and price, Trade cycles, Currency and coinage, Forms of business organizations, Home trade and foreign trade and transfers of money, Commercial insurance and banking, Transport, Selection of site, Depreciation, Sinking fund and valuation, Cost accounting, Mathematical determination of costs, Time recording, Stores and stock inventory, Contracts for supply and erection. Types of contracts, Tendering, Maintenance of building plant and machinery, Schedule and maintenance records, Inspection of plant and machinery and report.

(c) *Accounts*: Muster roll, Acquittance rolls, Measurement books and contract forms, Examination of bills, Procedure before carrying out works, Single and double entry systems of book-keeping journal, Day book, Cash book, Bank book, Bill book, Purchase book, Sale book ledger, Rules of balances, Trial balance, Balance sheets, Bad debts, Trading, Profit and loss accounts.

INDUSTRIAL MANAGEMENT (FIFTH YEAR)

Development of modern industrial organization, Systematic and Scientific management, its aims and advantages, Types of organization, Managerial control, Ideal managerial policy.

Personnel management, Conditions of employment, Selection of employees and their training, Housing and welfare work for the employees, Fixation of wages.

Plant layout, Factors governing plant layout, Procedure for layout, Power supplies, Conditions of work, Heating, ventilation and lighting, Other considerations.

Accident prevention and safety measures, Internal transport and mechanical handling, Types of equipments used, Automation and its advantages and disadvantages.

Choice of machines, tools and jigs and fixtures, Arrangement of layout of machines, Advantages and disadvantages of different layouts.

Time recording and workshop expenses, Variable and non-variable expenses, Elimination of wastes.

Motion and time study, Principles of efficient human motions, Basic elements of activity, Operation analysis, Time study analysis, Time computations, Setting standards, Fixing standard for machine operations, Means and methods used for motion and time studies, micro motion study.

Systems of payment of wages, Wage incentive, Wage incentive plans, Piece rates and premium bonus plans, Job evaluation, its methods and advantages, Merit rating, Classification.

Production planning, Jobs, Batch and mass production, Production control, Production analysis, Routing, Scheduling, Uses of charts, Selection of operation and machine loading, Progress charts.

Economics of tool engineering, Material cost consideration, Economic machines selection, Economic tool selection, Economic lot size, Operational economics, Purchasing *versus* manufacture.

Cost estimating, factors involved, Mathematical determination of costs.

Quality control and inspection: Inspection systems, Standard and standardisation of quality, Quality control, Planning and methods used, Use of charts, Method of inspection and equipment used.

Stores organization and control, Purchase organization and sales organization and market study, their functions, set-up, procedures and methods, essential considerations, their mutual relationship with other departments.

4.2 *An engineering university*

This institution, being more than 125 years old, is one of the long established and important educational institutions in the field of engineering education in the country. It has acquired the status of a university for the past several years. It grants the degree of Bachelor of Engineering in civil, electrical, mechanical, chemical and industrial engineering and in electronics, communications and metallurgy. It also grants the degrees of Master of Engineering and Ph.D. in all the above areas and Master of Science and Ph.D. in physics, chemistry, mathematics, geology and geophysics. Recently two new courses, one at the bachelor's and the other at the master's level in architecture, have been established. There is no provision for any degree in the field of humanities and social sciences. However, these subjects are taught to students preparing for the degree of Bachelor of Engineering as part of their curriculum.

The teaching of social sciences to engineering students is conducted by the Department of Humanities and Social Sciences. The department, though in existence since 1964, obtained the status of a department in 1972. Prior to 1964, the teaching of English and economics was conducted by part-time teachers. By the end of 1973 the department had eight full-time faculty members (three Readers and five Lecturers). Of the three Readers, one was in English, one in economics and one in psychology. Most of the faculty members were qualified in English, though some of them had a master's degree in another discipline also. The university authorities like to recruit faculty members who teach more than one subject. Taking this into account, five faculty members could be included in social sciences: one in economics, two in psychology and two in history. Some of these are doing research for Ph.D. degree. There have been some promotions in recent years and new appointments have been made.

Teaching of undergraduate classes for the students who are studying for the degree of Bachelor of Engineering is the most important activity of the department. Apart from individual researches for the Ph.D., there is not much evidence of significant research activity. The department did not have any research projects funded by outside agencies. No proposals

were submitted.

Recently, under the Quality Improvement Programme of the Ministry of Education, the university has taken upon itself the task of preparing a better syllabus for undergraduate engineering education for engineering colleges in India. In this connection the different disciplines in humanities and social sciences are also preparing model course outlines in their respective areas. Certain committees with inside and outside experts have been constituted and this work has made good progress. It is likely to be completed soon. This work has provided opportunities for interaction for the faculty members with outside faculty members.

A few of the faculty members are a little more active and have been attending academic conferences and seminars elsewhere. Some of them have also contributed papers to the seminars and conferences and got them published. One faculty member in economics has several publications to his credit, including two text-books suitable for engineering colleges.

The teaching of social sciences starts from the second year. The first course is entitled "Organizational Behaviour and Personnel Management". It carries 150 marks out of which 50 marks are for tutorials. The course contents include personnel management, selection and performance, organizational behaviour and industrial relations. The course outline is reproduced below. The class hours for this course consist of 3 lectures and 1 tutorial per week. In the third year economics is taught. The course contents include basic economic concepts, supply, demand and pricing, costs, profits, economic systems, money and banking, and economic development and planning with special reference to India. This course outline is also reproduced. There has been a proposal to include principles of management as a part of this course from the following year. As in the second year, the allotted time is three lectures and one tutorial per week. The course carries 150 marks out of which 50 marks are for tutorial work. A course on history of civilization, culture and technology is taught in the fourth year. It carries 100 marks out of which 25 marks are for tutorial work. The allotted time is 2 lectures and 1 tutorial per week.

All the three courses are compulsory. They are offered in batches to different groups of students in different engineering

disciplines. The average class size is of 30 students. The same course is taught several times which increases the workload of the faculty.

About two to three per cent of the amount spent on purchase of books for the library is expended on buying books in the fields of humanities and social sciences. Only one per cent is spent on journals. Departmental allocation of the library budget is made on the basis of student strength, by assigning 1 unit for an undergraduate student and 2 units for a post-graduate student. Obviously, the humanities department cannot hope to get anything on the basis of this formula as it does not have any students of its own. Hence an *ad hoc* grant is made to this department. However, the grant is meagre. In addition to the books purchased in the university library certain departments purchase books for the departmental libraries. The humanities department gets practically nothing in this respect also. However, over the years, the department has been able to purchase a certain number of books for the general library, which can be considered reasonably satisfactory. All the important and basic books in the concerned disciplines are there. There are in all about 1,35,000 books on social science subjects. As the books in humanities and social sciences are less costly than those in the physical sciences and engineering, it has been possible to acquire a proportionately larger number of books with the limited grant made available for this purpose. Recently, the university has opened courses for bachelor's and master's degrees in architecture. In this connection the civil engineering department has started buying books in sociology in general and urban sociology in particular. Similarly, books on industrial management are bought by various engineering departments. Books in these two categories are frequently used by the students. Books in other social sciences such as political science are not used very frequently.

The position regarding journals is really very depressing. Only 12 journals, some of them weeklies, were subscribed to in the field of social sciences, out of a total of about 500 journals subscribed. In addition, 6 weeklies are received as gift. The journals subscribed to are primarily in the field of economics, mostly those published in India. No foreign journals are subscribed to in the field of social sciences.

*Course outline
of Organisational Behaviour & Personnel Management*

INTRODUCTION

Definition and importance of behavioural sciences in industry. The development of management thought with reference to the work of Taylor, Gilbreth, Maye and Kurt Lewin.

PERSONNEL MANAGEMENT

Psychological aspects of personnel management

Personnel department, its functions and relationship with other departments

Maintenance of personnel records

Manpower planning

Personnel Selection

(a) Social background of the worker

(b) Individual differences

(c) Techniques of selection; personnel testing and interviews

Job requirement, Job specification and Job qualification, Training and placement.

Personnel Performance

(a) Factors affecting performance; Industrial motivation (with special reference to Maslow's Need Hierarchy); Emotions; Frustrations; Inter-personnel and Intra-personnel conflicts; Defence mechanisms

(b) Performance Evaluation (merit-rating) – Not for Mechanical Engineering

(c) Incentive schemes

(d) Social and Industrial pathology; Causes of maladjustment; Kinds of maladjustment; Effects of maladjustment; Remedial measures

ORGANIZATIONAL BEHAVIOUR

Definition of organization. Socio-psychological aspects of industrial organization, Formal and Informal organizations, Line and Staff organization, Communication processes, Organizational conflicts, attitudes, values, opinions and prejudices, Leadership, problems of supervision and morale, Importance of environmental conditions, Fatigue and Accidents, Work schedule and hours of work.

Industrial Relations

Management-union relations; Trade Union movements; Collective bargaining; Labour legislation; Employee participation in management; Strikes and Lock-outs; Promotion and demotion policies; Hiring, Firing, Lock and Transfer; Grievances.

*Course outline
of Economics & Principles of Management*

INTRODUCTORY BACKGROUND

Nature and significance of economics, science, engineering and technology, their relationship with economic development.

INTRODUCTION TO THEORETICAL ECONOMICS

Basic economic concepts, demand, supply, elasticity of demand and supply, money, real and opportunity cost, the concepts of profit and revenue, tax, tariff and subsidies, wants and utility, the concepts of equilibrium and margin, economic systems, capitalism, socialism and mixed economy, factors of production, introduction to micro and macro economics and price theory.

MONEY, BANKING AND TRADE

Nature and function of money, Commercial and Central banking, The problem of foreign exchange and Implications of currency devaluation.

ECONOMIC DEVELOPMENT OF INDIA

Industries and Labour: Structure and features of Indian economy, Industrialization of India, Economics of large- and small-scale production, Growth of public sector in India, Industrial disputes in India, Recent trends in labour movement in India.

AGRICULTURE

Role of agriculture in Indian economy, Problems of Indian agriculture, Modernization of Indian agriculture.

ECONOMIC PLANNING

The concept of under-development, Meaning and tools of economic planning, Study of the Five Year-Plans of India.

II – Principles of Management

MANAGEMENT PRINCIPLES

Management and engineering studies, Meaning and types of management, The concept of scientific management.

FINANCIAL AND ACCOUNTS MANAGEMENT

Sources of industrial finance, Financing of large- and small-scale industries, Institutional financing, Principles of accounting, Management accounting, Preparation of accounts.

SALES AND MARKETING MANAGEMENT

The sales organization of a firm, Management of sales and advertisement, Market research, An introduction to advanced techniques of management.

PRODUCTION MANAGEMENT

Production planning and management, Management and productivity.

History of Culture, Science and Technology

Section 'A'

1. An outline of the march of human civilization from the earliest times to the beginning of the modern age.
2. The intellectual revolution and the first scientific revolution.
3. Era of revolutions in Europe (the Industrial, the Scientific, the French, and the Russian) and their impact.
4. The present-day world of conflicting ideologies. The problems of co-existence and international co-operation.
5. Impact of science and technology on the development of modern civilization.

Section 'B'

1. Evolution of Indian social, economic and political structure

from the advent of the Aryans to the present day.

2. Impact of Buddhism, Jainism, Islam and the West on Indian culture.
3. Indian Art, Science and Technology through the ages.
4. A brief history of the freedom struggle – social, religious and political movements in India during the 19th and 20th centuries.
5. The present governmental structure in India – a study of theory and practice.

4.3 *Regional engineering colleges*

As already mentioned, there are 15 regional engineering colleges in the country established as joint and cooperative ventures of the Central and State governments. The position of social sciences in two such colleges is described in this section.

Institution A:—This institution has a Department of Humanities which has teachers in both humanities and social science subjects. The department started functioning from the very beginning of the college. Originally it had been placed under the head of the mathematics department. This arrangement continued for two years after which it was established as a separate entity. The department was started in accordance with the provisions of the Government of India Act establishing regional engineering colleges or institutes. There is some vagueness with respect to expectations from the department. It is supposed to impart both a liberal and a professionally relevant education. But in actual practice, the emphasis has been more on the latter. This explains the reason for the excessive emphasis on the teaching of the English language for strengthening the students' power of expression. The only course in the direction of liberal education is a course entitled "social sciences" which is taught in the second year, and carries only 50 marks. The importance of the basic knowledge of the principles of social sciences for professional engineering education has not been fully realised as yet.

Table 1, giving a detailed breakdown of the faculty position in different departments, indicates the relative position of humanities in the college.

Of the six faculty members in the humanities department,

Table 1

	Professor	Reader	Lecturer	Associate Lecturer	Total
Civil Engineering	1	2	4	3	10
Mechanical Engineering	1	2	6	4	13
Electrical Engineering	1	2	6	3	12
Structural Engineering	1	1	3	3	8
Physics	1	1	2	1	5
Chemistry	1	1	4	—	6
Mathematics	1	1	3	1	6
Humanities	—	1	5	—	6

only one is a Ph.D. According to the Principal's assessment, their academic qualifications are of the same level as those of faculty members in other departments. However, they suffer from a number of disadvantages arising out of the situation in which they are placed so that they do not appear to be happy with their lot. The engineering faculty members get an opportunity to improve their academic qualifications by working for the M.E. degree in their own college. No such opportunity is available to faculty members in the humanities department. They have to go to their respective university departments for this purpose. Moreover, unlike science and engineering disciplines, the Quality Improvement Programme of the Government does embrace the teachers of humanities and social sciences. The college library is also poor from the point of view of meeting their research needs. There are almost no social science journals apart from some economics magazines such as *Commerce*, *Capital*, *Productivity*, etc. These journals are not found necessary for the type of teaching done by the department. Nearness of the university library is another factor. The situation with regard to books is slightly better, though far from satisfactory. Most of the books belong to the disciplines of economics and management, though books on history, political science, and sociology are also available. A sum of Rs. 2,000 is allocated to the department for the purchase of social science books out of the total library budget of Rs. 85,000 for both books and journals. This amount, which appears inadequate, is a substantial improvement over the figure of

Rs. 500 in the previous years. The teachers get no opportunity for post-graduate teaching and teaching of social sciences to engineering students does not go beyond the elementary level. Hence the teachers in this situation do not get job satisfaction. Also, when they apply for better jobs elsewhere they do not get much professional recognition for their teaching. The teachers do not think that service in an engineering college is ideal for them. Moreover, they have an acute feeling of professional isolation. They feel that they belong neither to the engineering faculty nor to the mainstream of the faculty in their own discipline. The university departments in their own disciplines do not consider them for such privileges as examiner-ships, etc., which they could have got had they been in an arts college. Of course, there are a few advantages. The elementary level of courses taught by them as well as the lower workload leave them time which they can well utilize for doing research and thus grow in the profession. Their publications, however, which they list under the category "research publications", have been in newspapers and popular magazines rather than in standard research journals. The department has received no funds from research funding agencies. No proposals were submitted. There is no research assistant. Nor is there any research budget for the department. On the whole, the research level is of the standard of an affiliated college or slightly better. The department has no prospective plan of development. None is being contemplated.

There has been no change in the faculty of the humanities department during the past few years. While several faculty members in other departments, particularly engineering departments, have left the college for better positions, not a single faculty member from this department has left the college after joining it. This does not mean that the existing faculty members in the department are fully satisfied with their work and prospects. As pointed out earlier, the contrary is true. The lack of better opportunities elsewhere is mainly responsible for their continued association with the college.

This lack of mobility has tended to restrict the freedom of the authorities to introduce changes in the academic programmes. A new faculty member having a different specialization can be appointed only if the number of sanctioned posts is increased,

which, of course, is usually difficult. The engineering faculty is not completely satisfied with the type of courses taught by the members of the humanities department. They would have liked more courses in economics, management and other social sciences, but they feel that the present staff members cannot do this. The college authorities are in favour of the present staff members acquiring more professional knowledge in other fields. They expressed their willingness to provide the necessary facilities in terms of leave with full pay or half pay, etc., to the desirous faculty members. But the response has been poor as there is no incentive for a faculty member in terms of promotion or increments for diversifying his knowledge. It also appeared that in case any vacancy occurs, the authorities would prefer to appoint someone who has an interdisciplinary background and can teach more than one subject.

Social sciences and humanities do not occupy an important place in the course structure. The same is true of basic sciences, though their position is somewhat better. Table 2 gives information regarding teaching hours per week (lectures, tutorials and practicals, and marks at the examinations during the five years of the integrated Bachelor of Engineering course. Sciences, humanities and social sciences are taught during the first two years, primarily during the first year. From the third year onwards students are taught engineering subjects only.

The first year humanities course consists exclusively of English. The second year humanities course consists partly of English and partly of social sciences. The content of the social science course along with the names of the recommended textbooks are given below. This is the only social science course open to students. From the third year onwards different engineering departments have different courses for their students. In the final year all the engineering departments have an economics-based course of 100 marks and 2 hours per week. Thus the civil engineering department has a course entitled "Engineering Economics and Accounts" and the other departments have a course entitled "Industrial Organization and Management". The contents of both these courses are reproduced below. It is obvious that about 50 per cent of the contents are common to both. Till 1970, these courses were taught by the engineering faculty themselves. But since 1971 one economist from the

Table 2

	1st year		2nd year		3rd year		4th year		5th year	
	Hrs.	Marks	Hrs.	Marks	Hrs.	Marks	Hrs.	Marks	Hrs.	Marks
Physics	8	250	4	150						
Chemistry	8	250	4	150						
Mathematics	8	300	7	200						
Humanities (English)	5	200	1½	50						
Social Sciences			1½	50					2*	100*
Engineering	7	300	18	700	34-36	1300	34	1300	29-32	1450
Total	36	1300	36	1300	34-36	1300	34	1300	29-32	1550

*Economics and Management included under engineering courses.

humanities department is teaching the course in civil engineering and another economist is teaching it in metallurgical engineering. Electrical and mechanical engineering departments are still using their own faculty for these courses. Besides, the electrical engineering department has another course entitled "Electrical Engineering Economics" of 1 hour per week and 100 marks, taught in the final year by the electrical engineering faculty. It deals essentially with (1) Economic problems of power generation and transmission and (2) Feasibility of electrical machine design. There is no final syllabus for this as it is included as sessional work and not as a subject for written papers.

It may be mentioned here that the total academic performance in each year has different weightages in the calculation of the overall academic performance of a student at the end of the five-year course. The following scheme is utilized :

- 20 % for the 1st year
- 40 % for the 2nd year
- 60 % for the 3rd year
- 80 % for the 4th year
- 100 % for the final year

As a result of this the overall importance of the second year social science course for a student is further reduced. This might be an important reason why the students are generally not interested in the social science course. Another reason might be the general and introductory level of the course, which may fail to stimulate a student in contrast with the advanced level courses in other subjects. Students attend the social science lectures only because of compulsory attendance requirements. Few students care to read books. This problem of motivation is a serious one and must be tackled effectively if the social science disciplines are to play any meaningful role in the college.

The attitude of the Principal towards social sciences is sympathetic. There is no discrimination against the department with respect to provision of office space and office assistants. The Principal is aware of the importance of social science education for an engineer and has no objection to an increase in social science courses provided it is acceptable to the college faculty.

The attitude of the engineering faculty is also favourable and certainly not hostile. In spite of this, it has not been possible to increase the number of social science courses because no department is prepared to accept any reduction in its courses. Each department feels that it does not have enough time to teach all that it would like to teach. In the absence of any yardstick to measure the relative importance of the different and widely divergent alternative courses drawn from different departments, the *status quo* tends to be maintained. The members of the humanities department are not at all hopeful of increasing the number of social science courses in the near future. The only way of doing so seems to be through the introduction of management education, the importance of which is being increasingly realized. It may be mentioned here that no financial implications are involved. The present strength of the humanities department is adequate to take care of whatever little increase in course offerings can be visualized for the next few years. The three social science faculty members can teach more courses than they are doing at present if they get an opportunity to do so.

Course outline
Course on Humanities

(1) Section (b) *Social Sciences* :

INDIA

1. Influence of ancient Hindu civilization and culture on South-East Asian countries and modern civilization
2. Interaction of Hindu and Muslim cultures
3. Impact of the West on Indian society
4. Indian national movement from 1885
5. India after independence

Ideas and Institutions

1. European Renaissance in art and literature
2. Industrial revolution in England
3. Nuclear power and society

Economic Structure

1. Capitalism, socialism, mixed economy
2. Industrialization of India after independence

Political Structure

1. Democratic and totalitarian forms of Government
2. Special features of the Indian Constitution
3. United Nations Organisation

Books recommended

A. C. Chakravarti	—	Ancient Hindu Culture and Civilization (Vora & Co., Bombay)
Mulk Raj Anand	—	Is there a Contemporary Indian Civilization? (Asia Publishing House, Bombay)
Yusuf Hussain	—	Glimpses of Medieval Indian Culture (Asia Publishing House, Bombay)
M. Halayya	—	Social Sciences (Asia Publishing House, Bombay)
K. R. Bombwal	—	Indian Politics and Government (English Edition)
Arnold Toynbee	—	Industrial Revolution (Beacon Press, Boston)

Final Year B.E. Course in Civil Engineering 1971
Engineering Economics and Accounts

Economics

Principles and explanations of simple economic terms. National and private wealth, capital: fixed, circulating, non-specialized and specialized or sunk capital. Labour, productive and unproductive, intellectual and physical. Rent: net and gross, contract and quasi. Interest: gross and net profit, gross, net and surplus wages; time, piece, real and nominal; gross and net. Price: normal, subnormal, short and long period; its determination under competitive monopoly conditions. Cost of production, real, nominal, supplementary and prime. Relation between prices, rent and profits.

Agents of production, land, labour, capital, organization and enterprise. Principles determining remuneration for each of them. Factors affecting efficiency of labour and capital, division of labour, its merits and demerits. Laws of production: diminishing, constant, and increasing returns. Scales of production: large and small; their merits and demerits. Limitation of large-scale production. Advantages and disadvantages of machinery. Effects of

introduction of machinery upon employment and labour.

Localization of industries – causes. Advantages and disadvantages. Law of substitution as regards factors of production and use of materials in production.

Money – standard, token, limited and unlimited, legal tender, Gresham's law and Quantity theory of money. Index numbers.

Cheques – drawings, endorsing and cashing; open and crossed cheques. Classification of banks, commercial, industrial, co-operative, mortgage and Reserve Bank. Scrutiny of the balance sheet of a bank. Negotiable instruments and bills of exchange.

Public Finance – Principles of taxation and incidence of taxation.

Business organization types: sole proprietorship, partnership, joint stock companies, their advantages and disadvantages, different kinds of shares and debentures, rights, dividends, and risks. Cooperation. Produce distribution and credit.

Co-partnership and profit sharing. Nationalization of industries. State enterprise, monopoly and combination.

Book-keeping and Accountancy: Double entry, Journal ledger, cash book, petty cash book, Imprest system, Real balance, Final accounts. Trading account, Profit and loss account. Appropriation accounts and Balance sheet. Assets and liabilities; valuation of business assets for balance sheets. Bad debts and depreciation. Industrial relationship. Industrial legislation, Workmen's Compensation Act, Trade unions and their function. Employers' association, Strikes and lockouts. Prevention and settlement of disputes. Agencies for industrial peace. Employment exchange. Labour welfare. Conception of the welfare state. Unemployment.

Specifications:

1. Management: scientific management and relationship, rationalization, qualities of a good manager, office organization, works organization, planning and progress department, organization and management of stores.

2. Specifications, and contracts: definitions, general and detailed specification. Preparation of specification for inviting tenders. Information to be given on preliminary enquiry and on placing the order, essentials of a contract, documents in an engineering contract, contracts for supply, erection, guarantee, and

acceptance. Standard forms of contracts. Letting contract. Information required for inviting tenders.

Final Year B.E. Course in Mechanical Engineering 1971
Industrial Organization & Management (M.E.)

Business Organization; Types—partnership and joint stock companies, their formation and working, different kinds of shares and debentures, financial statements, balance sheet and profit and loss accounts. Co-operative organizations and state enterprises.

Industrial Management: Scientific management, types of organisations, organisation charts, essentials of a good organization.

Production Planning and Control: Planning, scheduling, despatching and follow-up, job and mass production. Inspection department and its duties.

Stores Organization: Functions of the stores department, material requisition, store records.

Industrial Economics: Prime and overhead cost. Principles of allocation of overhead cost. Different methods of depreciation. Standard cost and variances. Relative worth of alternatives.

Personnel Management: Selection, placement and training of technical personnel. Division and specialization of labour welfare activities. Working conditions, accidents and safety protection. Trade unions, and Works committees.

Wage payment: Types—time and piece rate system. Various incentive schemes. Profit sharing and co-partnership. Time and motion study. Merit rating. Job evaluation.

Factory location and Plant layout: Factors in selection of site as to suitability of land, service and local self-government relations. Materials, labour market and communication. Classification of manufacturing plants. Principles of plant layout. Material handling equipment. Factory building and services.

Industrial Laws: Indian Factories Act, Payment of Wages Act, Workmen's Compensation Act, Trade Unions Act, Industrial Disputes Act, Employee's State Insurance Act. Strikes and lock-outs—their prevention and settlement.

Institution B:—This institution prepares students for the

B.Sc. degree in engineering. In the five-year integrated programme, social sciences are taught in the third year only. There are two lectures per week, each of one hour. There is no provision for tutorials. At the end of the year a university examination of 100 marks is held. Economics, political science, and psychology are the three social science subjects being taught at the Institute. A student has to offer one of these three subjects. The course content, which is reproduced below, includes basic concepts of these disciplines.

In the fifth year students in electrical, mechanical, and metallurgical engineering are required to pass a university examination in industrial management. There are four lectures per week in this course. The detailed course outline is given below. It contains the salient features of industrial management such as business organization, management, the plant and the equipment, production planning, ancillary services, commercial and accounting services, labour compensation, and personnel.

Examining the course structure one easily finds that social sciences do not occupy an important place. Students are taught social sciences for only two hours per week for one year during the five years. The marks assigned are 100 out of a total of 800 to 900 marks per year for university examinations. Also, the pass marks for the social sciences as well as for the humanities and English are only 30 per cent as against 35 per cent for all other subjects.

The institute has a separate Department of Humanities and Social Sciences headed by a Professor of economics who is actively engaged in research. There is one other faculty member in social sciences, namely, political science. There has been no contact between the Humanities and Social Science Department and the industries located in the nearby town. One would have expected the Institute to be a centre of research in industrial studies due to its proximity to an industrial town. The faculty members in the department, however, have never applied to the fund-granting authorities for any research projects. There is no post-graduate research student.

The faculty members as a group do not seem to be satisfied with their lot. They find that the general atmosphere in the Institute is not sympathetic to them. The engineering departments have yet to recognize the real significance of social science education

for engineering students. They regard it as an unnecessary appendage.

3rd Year Social Science Course

(A) ECONOMICS

1. Economic concepts : wealth, want, utility, and national income.
2. Factors of production : land, labour, capital and organization.
3. Economic laws: law of demand, laws of return, theory of price determination under perfect competition, marginal productivity theory of distribution.
4. Economic growth, sources of economic growth, importance of investment, technology and education.
5. Forms of business organization.
6. Meaning of function of money, inflation, index number.
7. Credit instruments, cheques and bills of exchange, functions of commercial banks.
8. Characteristics of modern industries (i) Specialization (ii) Localization of industries.

(B) POLITICAL SCIENCE

1. Definition and scope of political science.
2. State – meaning, elements and functions.
3. Forms of government and kinds of constitution.
4. Meaning and kinds of (a) rights (b) liberty and (c) equality.
5. The UNO – aims and objects, principle organs and their functions.
6. Different kinds of constitutions.

(C) PSYCHOLOGY

(i) GENERAL PSYCHOLOGY

1. Scope and method of psychology.
2. Attention and perception: nature, kinds and conditions of attention, nature and process of perception, space perception.
3. Learning: nature and methods of verbal and mental learning, learning curve.
4. Remembering and forgetting: nature and process of remembering, nature and causes of forgetting, memory training.
5. Intelligence: nature and measurement.
6. Personality: definition, traits, determinants and measurement.

(C) PSYCHOLOGY

(II) SOCIAL, INDUSTRIAL PSYCHOLOGY

1. Public opinion and propaganda: Nature of public opinion; nature, principles and techniques of propaganda.
2. Leadership: Types and characteristics.
3. Social tension: Causes and remedies.
4. Physical environment: Illumination on atmospheric condition, net hours of work and rest pause.
5. Principle and methods of vocational selection.
6. Strikes and lockouts – causes and methods of control and prevention.

INDUSTRIAL MANAGEMENT—5th Year

1. BUSINESS ORGANIZATION

The legal forms of business organization and their formation. Ownership and operation of jointstock companies. Sources of finance and its procurement. The money conversion cycle in the business and analysis of income statement, balance sheet and annual report.

2. MANAGEMENT

The evolution of modern industrial organization and the need for management function. The elements of managerial activities – planning, organizing, staffing, directing and control, and their definitions. The universality principle of management function. Authority, leadership and principles of coordination. Line, staff and functional relationship of authority – span of control, use of committees as a management tool – value and application of organization chart. Various departments of an industrial enterprise and their main activities. Duties and qualifications of various departmental heads including the foreman.

3. THE PLANT AND EQUIPMENT

General consideration of factors and economy study affecting plant location. Selection of type of buildings equipments and services including materials handling. Replacement of equipment. Principles of plant layout.

4. PRODUCTION PLANNING

Type of production – job, batch and mass production, long- and short-term plans. Inventory control, scheduling, despatching, progress control and follow-up in manufacturing.

5. ANCILLARY SERVICES

Organization of design, store inspection, industrial engineering and works engineering activities and their main functions. Standardization, simplification, and specialization and their benefits.

6. COMMERCIAL AND ACCOUNTING SERVICES

Organization of the purchase and the sales departments and their main functions – managerial control through budgeting and cost accounting – summary of methods and techniques used.

7. LABOUR COMPENSATION

The basis of industrial wages, job evaluation and wage structure methods of payment of wages and incentives.

8. PERSONNEL ADMINISTRATION

Development of personnel function and its organization. Human relations and morale building. Trade unions, employer's organizations and collective bargaining, joint consultations, conciliation, and arbitration. Trade Disputes Act, Factories Act, Workmen's Compensation Act, Payment of Wages Act, standing orders and other legislations protecting the industrial workers.

Books for References

1. *Principle of Industrial Management* by Alford Beatty (revised edition)
2. *Industrial Management* by Springal and Lanburgh
3. *Introduction to Engineering Management*

4.4 *A specialized engineering institution*

The institution was established in 1926 as an all-India centre for education and training in the specialized field of engineering. It was administered directly by the Government of India from its very inception until June 1967 after which it was registered

as a Society under the Registration of Societies Act of 1860 and declared to be a university under Section 3 of the UGC Act of 1956. The objective of the school is to "provide for instruction and research in such branches of engineering and technology, applied sciences and applied arts as the school may think fit, and for the advancement of learning and dissemination of knowledge in such branches". The school grants the following degrees: B.Sc. (Hons.), M.Sc., and Ph.D. in the four branches of mining engineering, applied geology, petroleum technology, and applied geophysics.

The teaching of social sciences is conducted by the Department of Languages and Humanities. The department started in 1926, the year of the establishment of the school for teaching English and German. Earlier it was known as the Department of Languages. From about 1954, when besides English other subjects such as economics and history were also introduced, it came to be known as the Department of Languages and Humanities. There is now a move by the departmental faculty to rename it as the Department of Humanities and Social Sciences. By 1958 there were four faculty positions in the department. But in 1960, as a result of some reorganization only three posts remained and these have continued since then. Since 1969 there are only two faculty members in actual service.

Several expert committees were reported to have favoured the expansion of the Department of Languages and Humanities. The All India Council of Technical Education, at its 10th meeting held at New Delhi on 22 February 1957, recommended, among other things, that the "set-up of the school should be reorganized on the lines of the Indian Institute of Technology, Kharagpur", and with that end in view recommended the posts of one Professor and four Lecturers for the department. The UGC Committee, which visited the School on 10 and 11 August 1971, recommended that short-term courses ranging from 3 to 6 months or even to one year should be conducted on business management, labour relations, mine management, etc. A Committee of the Inter-University Board of India and Ceylon appointed to examine the matter of its admission as a member of the I.U.B. also suggested "that the students (of this institution) should have more time for the study of humanities and social sciences which will enable them to have liberal education in addition to their

specialized training in the school”.

The present position with respect to the teaching of social sciences is extremely unsatisfactory. The only social science course to which all the students are exposed, is civics, given in the second year. The civics syllabus is given below. The fourth year mining students are also exposed to history. The fourth year history course is a sessional subject, hence only one-fifth of its marks are added to the total. This further reduces the importance of the subject.

Certain improvements have already been proposed which will provide for greater emphasis on social science subjects. For instance, a history paper with two periods per week carrying 100 marks in the university examination is to be introduced in the second year. In the third year, there are to be three alternative courses in economics, political science, and psychology, of two periods per week and carrying 100 marks in the university examination. In the fourth year students may take one from among several humanities and social science subjects as an extra subject and only marks obtained above a certain minimum figure will be added to the aggregate marks.

There are certain social science subjects related to management which are taught by the faculty members in the engineering departments. These are: (1) One course on mineral economics of two lecture hours per week for fifth year geology students. (2) One course on petroleum economics of two lecture hours and one tutorial hour per week for fifth year petroleum technology students. (3) One course on legislation and another on management, each of one lecture hour per week for fifth year mining students.

From the point of view of its nature and objectives as well as its location, the institution is a unique one with much potential for the growth of social science teaching and research especially in the field of mineral economics and administration. This is also due to its proximity to important government offices related to its field.

2nd Year—humanities and social sciences

Time: 1½ hours

CIVICS

Marks: 60

Man and Society—origin and growth of society—nature—society

and the individual – social organization, associations – communities – the neighbourhood group – village and urban – religious and linguistic – national and international institutions – types – marriage – property – caste and untouchability.

State – what is a State? Nation, Nationality and State; State and Society; State and Government; Types of State and Government: Purpose and Functions of State; Different Theories of State action; Individualism, Socialism, Communism and Democracy. Citizenship – rights and duties of citizens; Acquisition and loss of citizenship – good and deficient citizenship. Nature and Purpose of law, crime – causes and punishment. World organization – UNO Human Rights and Obligation, World Government and World Citizenship. Indian Constitution – its salient features.

B.Sc. (mining) Part I

	(Sessional Exam and no University Exam.)
1 lecture class per week	1/5 of total marks of sessional exam are added in University Exam.)

HISTORY

1. *Pre-History*: Earth and life before man and early man in Paleolithic and Neolithic ages.
2. *Early civilization*: Transition to agricultural state; beginning and growth of civilization – cradles of ancient world civilization, Sumerian, Egyptian, Babylonian, Indian and Chinese civilizations.
3. *Greek and Roman civilization*: Glimpses of ancient Indian history and culture.
4. *Religious systems*: Growth of important religions of the World – Hinduism, Christianity, Islam and Arab civilization; Buddhism, Jainism and Judaism.
5. *Middle ages*: Chief features of the medieval age; growth of medieval institutions like monarchy, feudalism and church.
6. *Modern age*: Transition from medieval to modern age – scientific enquiry; growth of international trade and commerce – sea voyages of discovery and their effects; renaissance and reformation movements.
7. *Origin of modern scientific thought*: Study of the period

from the scientific revolution and the founding of modern scientific thought; formation of the main theories and conceptions, their philosophical implication and the interaction of science and society.

8. *Industrial revolution*: Its causes and nature; social, economic and political effects.
9. *Revolutions and growth of liberty and totalitarianism*: French revolution – constitutional struggle in England, and Russian revolution.
10. Resurgent India and growth of Indian nationalism; struggle for Indian independence; constitutional history of India.

*Courses of study for B.Sc.(Hons) exam in Applied Geology
Political Science & Government*

Nature, scope and methods of Political Science; Nature of the State; Origin of the State; Historical Development of the State. Justification and End of the State. Proper Sphere of State action. Concept of Welfare State: Theories of Rights and Duties; Sovereignty, Pluralism and Law; Classification of State and Constitutions; Organization Forms; Types of Governments; Democracy, Utilitarianism, Idealism, Nationalism and Imperialism; Socialism and Communism; Political Thought of Mahatma Gandhi; United Nations.

Books prescribed

1. *Political Science and Government* – J.W. Garner (The World Press)
2. *Introduction to Political Science* – R.G. Gettell
3. *Principles of Political Science* – Gilchrist (Orient Longmans)

Mineral Economics and World Deposits

Full Marks: 100
(50 for each section)

Duration: 3 hrs

SECTION—A

Mineral economics and significance of mineral industries in the national economy. Changing pattern in mineral consumption. Unique features of mineral industries. International demand

and supply and strategic importance of minerals. Future sources, marketing and trade of minerals.

Commercial grades and specifications and marketing of minerals. Basic principles of International controls, trade restrictions, productive incentives and taxation on mineral industries. Mineral conservation, stock piling, substitutes and scrap. Problems in the domestic and foreign exploitation of minerals. National mineral policies and mines and mineral legislations with special reference to India. Growth and progress and other features of the Indian mineral industry. General outlines of planning and management of mineral organisations.

Paper IV: Petroleum Economics

Economic structure of the Petroleum and Natural Gas Industry: Magnitude and economic importance of the petroleum industry. Major divisions of the industry and their scope. Exploration, production, transportation, refining, marketing and utilization. Private corporations and nationalised set-up.

Industrial organization for oil and gas production: Forms of industrial ownership. Organization of oil producing companies; job analysis. Policy planning. Report systems. Capital requirements of petroleum industry.

Labour management in petroleum industry: Industrial relations, employment procedures, job analysis and classification. Vocational training, industrial accidents.

Material and equipment used in petroleum industry: Cost of materials and production, equipment, variations in cost and supply. Variety of materials used in oil industry. Store-keeping methods. Arrangement of storage facilities, stock maintenance.

Petroleum Refining Equipment: Stills, Horizontal cylindrical stills, pipe stills, tube stills, heaters: plate and packed columns, shell and tube condensers, finned tube condensers; vapour heat exchangers or partial condensers; finned tube exchangers, pumps, reciprocating pumps, piston type pumps, rotary pumps, centrifugal pumps. Compression apparatus and equipment for recovery of gasoline from natural and refinery gas; filter pressers and operation, leaf type filters, drum filters, centrifuges.

Storage of gasoline and oil-safety and fire hazards, static electricity evaporation losses and prevention, water cooled tanks, microballoons, floating roof tanks, wiggins pootoon roof tanks,

breather roof tanks, pootoon systems, the Hortonspheroid, the Hertonsphere. Underground storage. Liquefaction of natural gas, storage and transport of liquid methane.

Conservation and utilization of oil and natural gas resources, assessment of energy requirements, the consumption pattern of petroleum products and the balance between diesel and gasoline consumption, recent advances in engine design and development and its impact on the consumption and production of petroleum products, fuel economy and fuel efficiency. Economics of refinery location and pipeline distribution, research patents.

4.5 The Indian Institutes of Technology

All the five Indian Institutes of Technology have a separate Department of Humanities and Social Sciences and have arrangements for teaching these subjects in different years of the 5-year B. Tech programme. In addition, all have a limited Ph.D. programme of some type or the other. The details of each institution, as far as available, are given below. Of the five Institutes, social sciences have developed most at Kanpur. Hence this institution is described in detail in the next section.

Indian Institute of Technology 'A'

"The aspirations of this Institute are based on a conviction that it should not only provide unique educational opportunities to all its students but it should make continuous efforts to develop as a centre of advanced studies and research in humanities, science and technology as are likely to promote the material and industrial development of the country." The inclusion of humanities in this list is quite significant.

Social science courses, particularly those in sociology and psychology are offered to all engineering and science undergraduate students. In addition, the Department of Humanities offers a one-year diploma course in Industrial Psychology and Industrial Relations. There were three students in this course in 1972-73. The department assisted several post-graduate programmes of other departments by offering the following social science courses:

(a) Urban Sociology

- (b) Public Administration and Local Self-Government
- (c) Educational Psychology
- (d) Personnel Management and Group Dynamics

There is provision for the enrolment of research students in industrial psychology.

Indian Institute of Technology 'B'

The Humanities and Social Sciences Department has a programme of work which emphasizes the cultural and humanistic aspects of education as essential and desirable ingredients in the process of technical education and training. In addition, it offers post-graduate and research programmes (M. Tech., M.S., and Ph.D.) in industrial engineering and management.

The undergraduate curriculum of the Department includes instruction in the following areas of social sciences: History and culture, economics, organizational psychology, and industrial management. Approximately 10 per cent of the total instruction hours are devoted to the teaching of humanities and social sciences spread over a period of ten semesters of the B.Tech course of the Institute.

The department offers the following full-time programme:

- (a) M. Tech. in Industrial Management and M. Tech. in industrial engineering which include course work and projects spread over four semesters.
- (b) M.S. degree by research in industrial engineering and industrial management.
- (c) Ph.D. degree by research in:
 - (i) Industrial Management: Financial Management, Personnel Management, Industrial Relations and Production Management.
 - (ii) Industrial Engineering
 - (iii) Applied Statistics.

The Department has three faculty members in economics, two in psychology, and one in history. One of them is a Professor and Head of the Department. The rest are Assistant Professors and Lecturers.

Indian Institute of Technology 'C'

This Institute did not have much scope for the teaching of social sciences in view of the limited number of faculty. For a long time the Institute had only one faculty member in social sciences, of the rank of Assistant Professor in the discipline of economics. It was only when Mr. 'X' joined the Institute as its Director that the social sciences received their due emphasis. In 1972 he appointed a senior social scientist in the field of psychology to the post of Professor and Head of the Department. However, it took about three years for the Director to get his ideas implemented. It was in the year 1973-74 that this I.I.T. made several appointments in social sciences. By the end of 1974 the strength of the department increased substantially.

Thus, with the exception of economics, the introduction of social science teaching is relatively recent at this I.I.T. Courses in industrial psychology were introduced in the year 1972. The economist and psychologist participate in two inter-departmental courses, namely, Introduction to Systems Theory and Environmental Engineering.

In a meeting held at this I.I.T. in October 1972, a feeling was expressed that the response of the students to courses in economics and psychology was satisfactory. It was the feeling of the social scientists that "among the engineering faculty, there exists some sort of inner resistance which comes out when any proposal for the addition of new courses is mooted. While some of the engineering teachers show enthusiasm for social science courses to be added, many others feel that these courses take away the time which could better be utilised in giving engineering courses."

Indian Institute of Technology 'D'

This I.I.T. seemed to have a promising start in the field of social sciences in the second half of the sixties when some competent social scientists joined the Department of Humanities and Social Sciences. However, within a few years some of them left the institution. Since then it has not been possible for the Institute to fill up the vacancies with persons of equal merit in spite of repeated advertisements. The exact number of faculty members in social sciences in general and economics in particular has been changing from year to year.

During 1973-74 the Department had a total strength of 13 faculty members, of which one was a Professor, six were Assistant Professors, five were Lecturers, and one was Associate Lecturer. Only four of them had a Ph.D. The rest had only M.A. Out of the 13 members, less than half were in the field of social sciences, primarily psychology, sociology, and political science. Thus, in terms of faculty, this I.I.T. is similar to the other I.I.T.s described earlier.

Social science courses are taught to undergraduate engineering students in the first two years of the five-year course. Besides, the department offers research programmes leading to the Ph.D. degree. During 1973-74 it had three research scholars, one under QIP and two under other schemes. Two candidates submitted their Ph.D. thesis on the following topics:

- (1) Factors affecting the occupational aspirations of higher secondary school students of Delhi.
- (2) Multivariate analysis of factors affecting job satisfaction of engineering teachers.

4.6 The experiment at IIT, Kanpur – A special case study

Here the approach to social science teaching is primarily one of providing a broad liberal education to the engineers to expand their horizon by exposing them to areas of study not normally included in the technological curriculum, to make them sensitive to a wide range of socio-economic phenomena and to enable them to appreciate their role in national reconstruction by responding fully to the challenges of their time. However, with the passage of time certain professionally relevant courses have been introduced, and more are likely to be introduced in view of the increasing demand for such courses from the students.

From the point of view of the institute, humanities and social science subjects are included in one category and together they account for about 14 per cent of the curriculum for the five-year B.Tech. programme. Usually two to three electives in social sciences in the first three years (core courses, as they are called) and four to six in the last two years (professional year courses, as they are often called) are offered. A student, if he likes, can be exposed to four courses in a particular social science discipline,

and several students avail of this option. The students show much interest in social science courses, and it is a pleasure to teach them. Introductory courses of the standard of B.A. are taught in the first three years and advanced courses of M.A. standard are taught in fourth and fifth year classes.

In addition, there is a Ph.D. programme in the three social science disciplines, namely, economics, psychology and sociology. Students with a first or high second class M.A. in a particular or related discipline are admitted to the programme after a rigorous selection procedure. The emphasis in the programme is on producing analytical and reflective thinkers and not just storehouses of information. The Ph.D. programme comprises both course work and dissertation. The course work consists of a minimum of eight intensive courses – seven in the students' own discipline and one in an allied discipline. A limited number of research scholarships and assistantships of the value of Rs. 400 to Rs. 600 per month are available. There are about 20 Ph.D. students in social sciences. Six Ph.D.s have already been produced, three in economics and three in sociology, all of whom are well settled in the academic profession.

The Ph.D. programme in each discipline focuses on specific areas. For example, the objective of the Ph.D. programme in economics is to make quantitative economists proficient in advanced economic analysis. In sociology the objective is to equip the students with the knowledge of social processes and forces that determine the course of society and with the methodological devices for study and analysis of these problems and events.

The economics faculty has recently developed a unique master's programme in economic science which has gained good acceptance in the Institute. It is reproduced in the Appendix.

Social science courses are taught by competent social science faculty, most of whom have a Ph.D. from the U.S.A., the U.K., and India and have authored several research papers and books. The quality of the faculty is of a very high standard. The faculty belong to all ranks ranging from Lecturer to Professor with a preponderance of Assistant Professors (or Readers). There is provision for five to six faculty members in each discipline. The department has successfully executed about a dozen research projects sponsored by several agencies such as

the Indian Council of Social Science Research, the Banking Commission, Government of U P., Planning Commission, etc. The social science faculty of the department have organized several short-term courses for university teachers and government officers including an eight-week course on Research Methodology in Social Sciences sponsored by the Indian Council of Social Science Research in 1972. The Institute has a very good library in social sciences. Excellent collections of important books necessary for carrying on research in the fields of economics, psychology, sociology, management, and administration are available. New acquisitions are being made every year. In addition, the library has a good collection of journals, both foreign and Indian, numbering more than one hundred. Most of the important journals in the major disciplines are subscribed to by the library. There is also a small departmental library which contains important reference books. The department has a well-equipped psychology laboratory, an adequate number of desk calculators for quantitative work and also access to the computer centre.

The academic environment at the Institute, the existence of some of the necessary infrastructure for growth such as an intelligent and motivated student community, a rich and rapidly growing library, a well-developed computer centre, and the presence of science and engineering faculty within easy reach all provide excellent conditions for the emergence of a centre for social science research particularly oriented towards quantitative techniques. There can hardly be better places for the study of such subjects as industrial economics, econometrics, regional studies, technology and society, industrial management, entrepreneurship, and so on. There is a need to explore the growth potential of the Institute as a major centre for social science research and education in the country. It may be mentioned here that the M.I.T. in the United States has already become a leading institution of the world in the field of Economics.

*Social science courses taught to engineering students
at IIT, Kanpur*

Economics

An introductory course in economics, designed to expose the

students to the basic economic principles related to demand and utility analysis, theory of production and cost, market analysis and distribution, is given at the core level. Some elements of national income accounting, income determination, taxation and forms of business organizations are also explained to them at this stage. All this constitutes a prerequisite for more advanced courses such as management and organization, macro-economics, economic development and planning, industrial economics, economic role of government, etc. These are offered as electives in the professional years of the B.Tech. programme.

All economics courses have been so designed as to be professionally relevant for the engineering students, who have to face many economic problems in planning, execution, and management of projects during their careers as working engineers. Similarly, at the national level engineering and technocrats take active part in nation-building activities through their association with the Planning Commission and other decision-making bodies. The attempt, therefore, is to familiarize the students with the complexities of the problem at the factory as well as at the national level.

Psychology

The main purpose of the core courses in psychology is to acquaint the students with the basic concepts and fundamental issues in the discipline. The professional year courses are oriented towards the study of social development, personality, and organizational psychology. Both creative and critical skills are emphasized at the advanced level. Some of the courses offered in the professional years are: Abnormal Psychology, Development Psychology, Interpersonal Dynamics, Psychology of Adjustment, Psychological Analysis of Contemporary Socio-Economic Problems, and Social Psychology.

Sociology

In the core years, an introductory course, "Man, Society and Culture" is offered. It seeks to elucidate the basic concepts necessary for the understanding of the nature of the human social order. At higher levels, the discipline offers three types of courses: (1) those concerned with acquainting the students with their own society, (2) those concerned with problems of development

and technology, and (3) those concerned with the study of industrial organization and problem-solving methodology. Courses in the first category are: Contemporary India (at the third year level, in which sociology participates along with other disciplines), Indian Society and Culture, Indian Social Problems, Industrial Revolution and India, Sociology of Indian Politics. In the second category, Sociology of Development is concerned with the sociological dimension of the problems of economic development in India and other developing countries. Technology and Social Change is another course which examines the impact of technology on society. The third category courses are: Industrial Sociology and Organization Theory, Analysis and Management of Systems, and Trends of Thought and Solution for Unstructured Problems. This category is based on social and management cybernetics and uses computer simulation modelling as a methodological tool.

In all, more than twenty courses in social sciences have been evolved and they are offered in various alternative combinations. The course contents of some of them are described below:

(1) *Introduction to Economic Analysis*

Basic economic concepts – Theory of Demand (utility and indifference analysis) – Theory of Production. Theory of the Equilibrium of the Firm and Industry under perfect and imperfect markets. Theory of Distribution – National Income and its determination – Role of Government in economic activity.

(2) *Management and Organization*

Plant engineering and material management, capital budgeting, cost control, inventory control, marketing management, methods of sales forecasting, capacity balancing, operation research, mathematical programming, personnel management, unique nature of human resource, selection and development training, human relations and leadership.

Understanding of Indian system and maximizing the environmental resources.

(3) *Industrial Economics*

A study of the economic aspects of industries – industrial

promotion and finance – location and scale of industries.

(4) *Macro-Economics*

Economics of aggregates, National Income – Consumption, Savings and Investment, Employment – Price Level – Growth Models.

(5) *Economic Development and Planning*

Meaning of economic development, classical theories of economic development, (Adam Smith, David Ricardo, Carl Marx). Neo-classical models of development: (Emphasis on Schumpeter's models). Post-Keynesian model – Factors responsible for economic development: land, labour, capital, technology – Principles of planning and policy.

(6) *The Economic Role of the Government*

Government sector and Economic organization: Organizational features of the economy, size of the Public Sector. Public production and resource use.

Fiscal functions and organizational features of the economy, provision of public wants – social and merit wants. Role of the budget in providing for the satisfaction of public wants, adjustment in the distribution of income and stabilization.

Government Sector and Economic Development: Variation in the fiscal structure with economic development: Share of Public purchases of goods and services in GNP and the role of transfer payments. Tax structure development and debt finance variations.

(7) *Introduction to Psychology*

Introductory survey of the basic principles and concepts in modern psychology. The course includes the study of sensory and perceptual processes, motivation, learning, cognition, personality, and individual differences.

(8) *Psychology of Adjustment*

This course will deal with the psychological factors that determine mental health. Understanding of mentally disturbed will also be taken up in order to understand the whole spectrum of mental maturity and adjustment.

(9) *Social Psychology*

The course intends to expose the students to the theories and methodologies of social psychology. Critical analyses of the processes involved in person-to-person, person-to-group, and group-to-group interactions will be made. In general, topics such as interpersonal attraction, impression formation, attribution, aggression, attitudes, social influence, leadership, helping and inter-group relations will be covered.

(10) *Industrial Psychology*

Taylorism and scientific management, employment psychology, and training. Test of special abilities and personality assessment attitudes, morale, and adjustment; principles of psycho-technology and consumer psychology; Communication and leadership in organization, union-management relations.

(11) *Interpersonal Dynamics*

The focus of the course will be to understand human behaviour in two persons and in group interaction. The manifest and the latent, the verbal and the non-verbal will be studied in the context of environmental factors. Analysis of cases, role playing, group discussions will be the same as of the techniques used for learning principles of interpersonal and group dynamics.

(12) *Introductory Sociology*

A study of human and social evaluation, bio-social and socio-cultural systems. Outline of sociological perspective and its distinctive character. Fundamental concepts of sociology, social structure – status and role, values and norms, culture, society and personality, social groups and forms of interactions, social stratification, population and human economy, and social change. Society and its response to modern science and technology in India.

(13) *The Industrial Revolution*

The first part of the course will cover the period of the Reformation to the beginning of the Industrial Revolution in England and the formative conditions of industrial

capitalism. The second part is concerned mainly with the impact of Industrial Revolution on the growth of Indian industry and economy in general and also with the emergence of new social classes and social change in India from the nineteenth century onwards.

(14) *Analysis and Management of Systems*

System perspective and the structure of problem situation, diagnosis and analytical approaches, formulation of dynamic system models, analysis and decision in organizations, values and the nature of a solution process, military and public affairs.

(15) *Indian Society and Culture*

Theories of civilization, an analysis of Indian history in the light of theories of civilization; caste, group and caste systems, structural and cultural aspects and changes, caste in modern India; joint family, its features and changes; marriage, its characteristic features, problems and changes; continuity and change in the Indian social structure.

4.7 An Institute Deemed to be a University

This institution was created in 1964 as a “deemed University” carved out of the then existing three colleges. By 1973 it developed a 5-year integrated programme leading to appropriate degrees in science, engineering, languages, social sciences, and management studies. For all these courses, it admits students having passed higher secondary with physics, chemistry, mathematics, and adequate English. The distinguishing feature of this institution is the provision made for master’s courses in social sciences (only economics at the moment) apart from courses in sciences and engineering. The social science content of engineering education and the master’s programme in social sciences is therefore highlighted here.

Undergraduate engineering students have to take one course in a humanities elective during the two semesters of the second year and the first semester of the third year.

Several courses in social sciences are floated along with those in humanities in the category of humanities elective and a student is supposed to select one in each of the three semesters. Thus, a student has the option to take upto three social science courses. In addition, all students have to take a course in principles of management in the second semester of the third year. There is no provision for social science courses in the first, fourth, and fifth years.

The following elective courses in social sciences are offered:

- (1) Principles of Economics
- (2) Main Currents of Modern History
- (3) Impact of Science and Technology
- (4) Contemporary India
- (5) Modern Political Concepts
- (6) Introductory Psychology
- (7) Dynamics of Social Change

Among the social sciences, there is provision for a master's programme in management studies. Several social science courses are taught in these two programmes, the details of which are given below.

In the first year, there is a common programme for all students consisting of English and basic sciences. The seven social science courses and the courses on principles of management are offered as compulsory courses (along with others) in the second year and the first semester of the third year.

The following gives a detailed description of courses prescribed for M.A. economics in all the five years.

<i>I Year</i>			
<i>1st semester</i>	<i>Units</i>	<i>2nd semester</i>	<i>Units</i>
General English I	3	Chemistry	3
Mathematics I	5	General English II	3
Concepts in Science	4	Mathematics II	5
Engineering Graphics	4	Physics I	3
		Workshop practice	4
<i>II Year</i>			
Principles of Economics	3	Mathematics IV	3

<i>1st semester</i>	<i>Units</i>	<i>2nd semester</i>	<i>Units</i>
Report writing and comprehension	3	Modern Political concepts	3
Main currents of modern history	3	Introductory psychology	3
Mathematics III	3	Topics in Chemistry	3
Symbolic Logic	3	Dynamics of Social Change	3
Topics in Physics	3	Computational techniques	3

III Year

Micro-economics	3	Macro-economics	3
Agricultural Economics of India	3	International economics	3
Probability and Statistics	3	Econometrics	3
Principles of Management	3	Optimisation techniques	3
Introductory Philosophy or Comparative Indian Literature	3	Contemporary India	3
Free Elective	3	Free Elective	3

IV Year

Industrial Economy of India	Public Finance
Welfare Economics	Economic Dynamics
Monetary Economics	Mathematical Economics
Systems Analysis	Macro-economic Models
Impact of Science and Technology	Operational Research

V Year

Developmental Planning in India	Economics A591T Thesis
Indian Finance	Economics A594T Seminar
Project Appraisal	
International Economic Policy	
Departmental elective	
<i>Departmental Electives</i>	
Economics of Public Sector	
Manpower Analysis	
Urban Economics.	

There is provision for Ph.D. programmes in economics,

history, and political science.

The course outline of the social science courses are given below. Only the first course in economics, namely, ECON A211 (Principles of Economics) is offered to engineering students. The rest of the economics courses are for students studying for a master's degree in economics. Courses in other subjects numbering from 20 to 26 are offered to engineering students.

(1) *Principles of Economics*

Definition: economics and other sciences; sub-divisions within economics; measurement in economics, theory of the consumer, Engel curves, resource allocation and theory of the firm; market demand and supply, national product and income accounts; money – its forms and functions.

(2) *Macro-economics*

National income accounting: models of aggregate production, and consumption, quantity theory of money and its variants; classical theories of saving, investment, interest, wage-rate and employment; Walrasian model, Keynesian criticism of classical theories, Keynesian economics, the multiplier and the accelerator, determination of average price level.

(3) *Micro-economics*

Theory of demand, empirical determination of demand relationship – production and cost; linear programming and the theory of production; the firm and its objectives, market structure, pricing and output, theory of distribution, theory of capital budgeting, Numann Morgenstern Cardinal utility.

(4) *International Economics*

Monetary systems; determination of the rate of exchange, international payments, exports and imports of merchandise and services, unilateral transfers, international investment, classical trade theory, the protective tariff, state trading, bilateralism and cartels, economic effects of trade restrictions, foreign loans, economic unions and communities, international commodity agreements.

(5) *Agricultural Economy of India*

Agriculture in the Indian economy, agricultural inputs and outputs, trends and patterns, land in the structure of Indian agricultural economy, pattern of landholding, agricultural labour, capital, finance and prices, production and cost function in Indian agriculture.

(6) *Econometrics*

Specification of models, estimation of economic relationships and related problems, forecasting and verification.

(7) *Industrial Economy of India*

Role of industrialization in India and its features, structure of the non-agricultural sector, pattern of investment, capital-output and capital-labour ratios, demand structure and industrial capacity, conditions of labour, wages and prices, urban unemployment, causes and remedies, role of private and public sectors, industrial policy, industrial finance.

(8) *Welfare Economics*

Social choice and economic welfare, modern theories and models of welfare economics.

(9) *Monetary Economics*

Markets for financial assets, money and primary securities, real growth and price behaviour, financial restraints on real growth, primary and indirect securities, money in a complex financial structure, non-monetary financial intermediaries, basic elements of monetary control.

(10) *Public Finance*

Components of the annual budget of the Government of India, principles of taxation, justice in taxation, the theory of incidence of taxation, the effects of taxation on production and distribution, non-tax revenues, the theory of the public expenditure, public expenditure and its effects on production and distribution, the economics of public debt, the principles of federal finance.

(11) *Economic Dynamics*

The classical dynamics, Marxian and Schumpeterian dynamics, Harrod's model, comparative static models, process analysis, the turnpike theorem, models with policy implications.

(12) *Mathematical Economics*

Mathematical formulation of simple dynamic models, difference equations and their applications, Walrasian general equilibrium theory, Leontief input-output model, stability analysis, dynamics of regulation processes.

(13) *Developmental Planning in India*

The basic problem of planning, the formulation of perspective plans in the planning models of India, formulation of five-year plans, formulation of annual plans, manpower planning in Indian plans, the estimation of parameters in Indian plans, triangulation of the matrix, computation of fixed capital capacity matrix, the export and import submodel, the consumption-income submodel.

(14) *Indian Finance*

Federal finance in India, analysis of Indian tax-structure particularly that of the Central government, public expenditure, public debt in India, deficit financing in India and its consequences, quantum of foreign aid and its utilization, monetary control and financial policy, alternative instruments of financial policy, role of Reserve Bank of India, regulation of money supply and promotion of economic growth.

(15) *Project Appraisal*

The characteristics of sound projects, the identification of White Elephant projects, criteria for selection of a project, factors intensity criteria, the plant size and complexity criterion, the commercial profitability criterion, the national economic profitability criterion, Government industrial projects, project organization, analysing the economic feasibility of a project, presenting projects for financing, the approach of industrial projects.

(16) *Economics of Public Sector*

Public sector in the Indian economy, objective, structure and organization, factor endowment and resource allocation, price policies, indicators of economic efficiency.

(17) *Manpower Analysis*

Supply of labour and demand for labour – concepts and projections, educated manpower, educational structure, the functions of educated manpower, occupational structure, the relationship between education and occupation, rates of return to education, production functions.

(18) *Urban Economics*

Urbanization and the planning process, the structure of economic activity in urban areas, the economic function of the city, failure of the market as a regulator decision-maker, urban public services, costs and revenues, urban transportation – mobility problem, urban housing problems and policy, forecasts and projections.

(19) *International Economic Policy*

The pure theory of international trade, a survey and some controversies, gains from trade and comparative advantage, tariffs, quantitative restrictions and subsidies.

(20) *Main Currents of Modern history*

Renaissance, the major revolutions of the world, rise of nationalism, growth of imperialism, world between the two world wars, super powers and the contemporary world, resurgence of Asia, protest movements in Africa and Latin America.

(21) *Impact of Science and Technology*

Elements of scientific thinking, statistical models for social systems, role of science in social change, impact of science on the environment, impact of science on society in terms of (i) developments in modes of transportation and communication and (ii) discoveries of materials with different properties and innovations in sources of energy, impact of science on the quality of life, automation as outcome of

developments in science, noise, political consequences of rise of science, role of science in India's future.

(22) *Contemporary India*

Topics will include some or all of the following: economic process, contemporary Indian planning and industry, political processes, contemporary Indian political scenes and Indian administration, India and the contemporary world, social processes, contemporary Indian educational scene, religion and caste systems, Indian science, Indian women, cultural processes, contemporary Indian art, music, dance, theatre, cinema and literature.

(23) *Principles of Management*

Definition, scope and importance of management, development of management thought, managerial function at various levels, functional areas – manufacture, finance, personnel, purchasing, marketing, organizing and control; management systems in public and private sector enterprises.

(24) *Modern Political Concepts*

Nature and scope of political science, emergence and basis of State, rights and duties, forms of government, democracy, fascism, capitalism, socialism, anarchism, communism, Maoism, radicalism and Gandhism.

(25) *Introductory Psychology*

The development of psychology as a science, individual and the environment, nature, kinds and determinants of perceptions; response mechanism and kinds of responses motivations; modifications of behaviour through learning, memory, and transfer of training; thought processes, problem solving, and creative thinking; nature and characteristics of psychological tests; nature and evaluation techniques of intelligence and personality.

(26) *Dynamics of Social Change*

Nature of society, social institutions, concept and nature of socio-cultural change; obstacles, rate, and direction of

change; factors of social change – ideological, economic; technological, and political demographics; agencies of social change, education, leadership, propaganda, legislative reforms and five-year plans and social change, peasant and land reforms, bhoodan and gramdan, changing patterns of family, marriage, caste, and religion.

5. Social science as recommended for regional engineering colleges

In 1971, the Government of India had appointed a Committee under the Chairmanship of Dr. Jati Krishna, Vice-Chancellor, Roorkee University, to review the working of the regional (or central) engineering colleges and make recommendations for their future set-up. The Committee submitted its report in February 1974. Among other things, the Committee made recommendations regarding humanities and social sciences. The relevant portions dealing with social sciences are reproduced below:

“The Humanities and Social Science programmes in the Central Engineering Colleges have, by and large, not emerged from a clear understanding about the role of these courses in the education of an engineer and the all-sided development of his personality. With the teaching of languages being an unequal common component, these programmes generally constitute aggregate of *ad hoc* courses. It is, therefore, necessary that the objectives of the Humanities and Social Sciences programmes in technological institutions are properly defined.

The objectives of these programmes may be looked upon from the following points of view:

- (i) The requirements of the training of an engineer as an engineer;
- (ii) the role of liberal education in the all-sided development of the learner's personality;
- (iii) the contribution to the strengthening of national outlook, to which these institutions are specially wedded; and
- (iv) the development of social sciences in the special milieu of technological institutions of higher learning.

There is an increasing realization that the traditional distinction between the generalist and the technocrat is false, and that the engineer in a developing democracy, with a fast expanding industrial sector, needs to be equipped with an expertise which will enable him to shoulder with competence non-technical responsibilities as well.

This aspect of the training of the engineer has two components:

- (i) Communication skills: Training in language skills is as such a part of the training of the engineer as, for example, in Engineering Drawing. This should not be confused with education in Humanities.
- (ii) Social science sub-disciplines: The engineer requires a certain level of training in some sub-discipline of the social sciences to enable him to effectively shoulder his responsibility as an engineer. Unfortunately, the identification of such areas has not been given adequate attention so far. The Joint Committee of engineering and social science faculties should work out appropriate courses in Humanities and Social Sciences.

Since a large number of students join the engineering degree programme after the Higher Secondary Examination at 17+, the component of liberal education in the total educational process acquires substantive significance in spite of the time constraints. This calls for a proper blend of curricular, co-curricular, and extra-curricular programmes and cannot be left only to traditional methods of pedagogy.

The national character of these institutions calls for the introduction of a common compulsory programme and a fairly in-depth programme on Indian civilization which aims to correct distortions arising out of regional, communal, linguistic, and casteist parochialism and chauvinism and presents the image of the composite national culture of India.

Any substantial input for social programmes in the educational sphere, in order to achieve optimal results, should, in addition to the training of the engineer, also lead to the development of social sciences themselves in directions possible only in technological institutions.

This is important for the following reasons:

- (i) The interface of social sciences with technology is in an underdeveloped stage in India and can properly develop in the climate of technological institutes of higher learning on the basis of interaction between social scientists and technologists. The following such areas may be tentatively identified: (a) Industrial Management, (b) Industrial Economics, (c) Industrial Psychology, (d) Industrial Geography, (e) Industrial Law, (f) Industrial Sociology, (g) History of Science and Technology, (h) Systems Analysis of Social Phenomena, (i) National Resource Management, (j) Regional Development.
- (ii) These programmes act as a full factor for faculty members of high competence and give them job satisfaction.
- (iii) These in-depth programmes create the academic infrastructure for the programmes in social sciences for the training of engineers, in selected sub-disciplines to be of a high order, because imparting of knowledge would get linked up with its generation and would also lead to the integrated development of social sciences in the country.

It is suggested that every Central Engineering College should concentrate its faculty and other inputs in a suitable area taking into account regional needs.

The core faculty in Humanities and Social Sciences should consist of experts in communication skills and in the selected area of specialization. The rest of the programmes may be handled by part-time teachers selected by the colleges, as far as possible from educational institutions in the neighbourhood. Funds should be earmarked for this purpose.

Reading material relevant to Indian conditions is not adequate for these courses at present. It is, therefore, suggested that the Central Academic Board should take steps to get such material prepared expeditiously."

APPENDIX I

(A) Copy of the Questionnaire on Status of Humanities & Social Sciences Education in Engineering Colleges of India

Note: Broadly speaking Humanities include English, History & Philosophy and Social Sciences include Economics, Political Science, Psychology and Sociology.

A. General

1. Name:
2. Name and address of the college to which you belong:
3. State in which it is situated:
4. Financing agency—Central Govt., State Govt., Private Agencies:
5. Total number of students (approx. No.):
6. Total number of faculty members (approx. No.):

B. Teaching

7. How many humanities and social sciences courses are offered to students?

No. and name of Hum.: Soc. Sci. courses	Content Hours in each	Compulsory or elective	Total No. of all courses including engineering ones
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- 1st year
2nd year
3rd year
4th year
5th year

8. Is the weightage of a course in humanities and social science subjects the same as that of a course in engineering subjects? Yes/No
9. (a) Are the social science courses designed to cater to the professional needs of engineering students, e.g., managerial or engineering economics, industrial psychology, etc? Yes/No
If yes, then name such courses.
(b) Are the social science courses designed to give a broad

and general education to engineers without any regard to professional utility, e.g., a course in human civilization or political science? Yes/No

(c) Both (a) and (b) Yes/No

C. Faculty

10. (a) Do you have a humanities and social science department? Yes/No

(b) If yes, then how many faculty members are there in,
Economics
English
History
Psychology
Philosophy
Politics
Sociology

(c) If there is no humanities and social science department, then how are humanities and social science subjects taught? (i) by engineering faculty, (ii) by hiring part-time lecturers from local arts colleges, (iii) by other (please specify).

Name of the Institutions to which the respondents who filled in the questionnaire belonged:

<i>Name of State</i>	<i>Names of Institutions</i>
Andhra Pradesh	1. University College of Technology, Osmania University, Hyderabad. 2. Regional Engineering College, Warangal. 3. Government College of Engineering, Kakinada.
Bihar	4. Muzaffarpur Institute of Technology, Muzaffarpur.
Gujarat	5. Birla Viswakarma Mahavidyalaya, Vallabh Vidyanagar, Anand.
Haryana	6. Regional Engineering College, Kurukshetra.
Karnatak	7. P.E.S. College of Engineering, Mandya. 8. Karnatak Regional Engineering College, Suratkal.
Kerala	9. College of Engineering, Trivandrum.

<i>Name of State</i>	<i>Names of Institutions</i>
Madhya Pradesh	10. Government Engineering College, Trichur.
	11. Shri G.S. Institute of Technology and Science, Indore.
Maharashtra	12. Laxminarayan Institute of Technology, Nagpur University, Nagpur.
	13. Visvesvarayya Regional College of Engineering, Nagpur.
Orissa	14. Regional Engineering College, Rourkela.
Punjab	15. Deptt. of Chemical Engineering, Panjab University, Chandigarh.
	16. Thaper Institute of Engineering & Technology, Patiala.
Tamil Nadu	17. A.C. College of Engineering & Technology, Karaikudi.
	18. I.I.T., Madras.
	19. Coimbatore Institute of Technology.
	20. P.S.G College of Technology, Coimbatore.
	21. College of Engineering, Guindy, Madras.
	22. Thiagarajan College of Engineering, Madurai.
	23. Deptt. of Chemical Engineering, Annamalai University.
Uttar Pradesh	24. H.B. Technological Institute, Kanpur.
West Bengal	25. I.I.T., Kharagpur.

APPENDIX II

Proposal for M.Sc. Programme in Economic Science as Formulated by Economic Faculty of I.I.T., Kanpur

I. OBJECTIVES

It is proposed to introduce an M Sc. programme in Economic Science which will emphasize certain well-defined areas more useful from the point of view of industrial and economic development of the country. The programme will lean heavily on the type of resources which are available at the Institute and will differ fundamentally from the conventional programmes offered in the universities.

In the recent past it has been observed several times that the spectacular growth of science and technology has increased the complexity of our economic system and that a new educational philosophy is necessary to bring about a coordination between the economic imperatives of technological development for growth and the ever-expanding techniques of analysis which appear in response to modern demands. In such a milieu the demand for economists performing generalized functions for the government has reached a plateau whereas there has been (and there will be in the foreseeable future) a much greater demand for economists who can understand the detailed technical and scientific information flows which constitute the basic data for decision-making and who are equipped to make the specialized decisions demanded of them by the modern industrial environment. Hence, an M.Sc. programme in Economic Science has to be reoriented in such a way that it emphasizes not only scholarship and mastery in the traditions of the disciplines but also provides experience in problem-solving and decision-making in specific branches of activity which evolve in the process of economic change.

The fact is that the need is so definitely felt in several key sectors that private enterprise such as the Tata Economic Consultancy Service have already come into existence. That with growing industrialization the demand for such persons will increase need hardly be stressed.

Implementation of the suggested reorientation require, in somewhat more specific terms, that students who receive an

M.Sc. in Economic Science should acquire sufficient background in the following:

- (a) Science and technology which provide the base of modern industry,
- (b) Knowledge of the interaction between economic and social order with technological and economic growth, and
- (c) Modern methods of systems analysis and econometrics.

In addition to the need for such economists mentioned earlier, the feasibility of such a programme is more than adequately demonstrated. For,

- (a) Several of the most prominent economists of the world have come to economics after acquiring their basic degree in science, engineering and mathematics.
- (b) Contributions from practising scientists and engineers to economic analysis are by no means unknown, and
- (c) Both in other countries and our own, industry and professions have demonstrated that persons with such training are the most useful among the economists.

However, this type of specialized programme can be implemented only at a few institutions in the country due to the basic environment required for its success. We believe that IIT-K is one of these. We, therefore, propose to introduce an M.Sc. programme in Economic Science with a selected number (10 to 15) of students.

II. ADVANTAGES AT I.I.T., KANPUR

The following specific details may be noted in evaluating the successful implementation of the programme at I.I.T., Kanpur,

- (a) The built-in flexibility of our system to modify or revise syllabi in the light of experience gained and the feedback from participants presents relatively few organizational constraints.
- (b) The faculty of the discipline has been exposed to such a reordering of the programme in the past (both by way of training as also by their experience of teaching and research

abroad and at home). Some new faculty, specifically trained to suit the purpose, can be acquired without much difficulty. Further, we can receive competent help from some of our colleagues in the engineering disciplines.

- (c) The present educational programmes at I.I.T., Kanpur, already contain several courses which should be an integral part of the proposed M.Sc. programme (for instance, operations research, computer programming, and systems analysis).
- (d) The normal growth of library facilities as witnessed during the past five years should be reasonably adequate.

Thus the Institute provides the requisite infrastructure, the returns from which can be optimised by putting very modest additional resources in the economics discipline.

III. OTHER DETAILS

We now offer a few operational details of the programme:

1. The M.Sc. programme should be of two-year duration. The minimum qualification for admission to this programme should be a bachelor's degree in science with physics, chemistry, and mathematics. Students enrolled in the B.Tech. programme in I.I.T., Kanpur, may also be considered for admission to the M.Sc. (Economics) programme if they have satisfactorily completed the first three years of the B.Tech. programme.

2. The M.Sc. programme will envisage 18 semester courses and one thesis equivalent to 2 courses. The distribution of the courses between different branches of economics will be as follows:

- (i) *Economic Theory*
 - a. Micro Economics
 - b. Macro Economics
 - c. Mathematical Economics
 - d. Economic Growth and Development
- (ii) *Methodology of Economics*
 - a. Methods of Economic Analysis
 - b. Introduction to Computer Programming
 - c. Econometrics
 - d. Applied Economics
 - e. Systems Approach to Economic Analysis

- (iii) *Applied Economics*
 - a. Power Economics
 - b. Transportation Economics
 - c. Environmental Economics
 - d. Process Economics
 - e. Problems in Transfer of Technology
- (iv) *Industrial and Managerial Economics*
 - a. Industrial and Labour Economics
 - b. Project Planning
 - c. Project Appraisal
 - d. Managerial Economics

Depending on the availability of staff, courses can be offered so that students have options in Groups (ii), (iii) and (iv), as also other courses not falling in the above groups. For certain courses, cooperation from engineering departments would be sought. Students will be given option to study certain engineering courses in their area of specialization.

3. During the summer recess, students will be sent to industry and government to acquire requisite practical experience.

SOCIAL SCIENCES IN MEDICAL EDUCATION

*Somnath Chattopadhyay**

Introduction

SINCE THE TIME of the Bhore Committee report which stressed the importance of teaching preventive and social medicine in medical colleges, most of the committees on medical education have acknowledged the need for including social sciences in medical education. The importance of this is accentuated if the need of the country today is kept in view. By and large, medical colleges have brought out students who become white-collar city doctors. As a result, 80 per cent of the doctors are concentrated in cities and towns to serve 20 per cent of the population of the country. The manner of this service is too well known to require further elaboration. Barring the exceptions of exemplary individuals, the medical college-educated doctors as a class have alienated themselves from society, notwithstanding the great scope they have to be with the people. Social commitment, at least social awareness, is perhaps the basic minimum that should be expected from these graduates, for whose education the society spends a great deal. But the graduates are what the colleges have made them to be. It would be worthwhile analysing what efforts the colleges have made to inculcate among their students not only mastery of the subject-matter of their profession, but also social awareness and a sense of social commitment. The teaching of social sciences has been considered a step in this direction. It is not being proposed

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here that social commitment can be induced only through the teaching of social sciences or that in the absence of teaching of social sciences no commitment can occur. It may be grossly erroneous to state that the teaching of social sciences will definitely induce social awareness or commitment. This commitment is a function of multiple factors which include, *inter alia*, teaching of social sciences. The content or the syllabus, the teachers and their commitment, the students and their preferences, the college and its environment, the emphasis and importance attached to it, the method of teaching, are a few of the factors that determine the effectiveness of the teaching.

Objectives

The study reported here has a very limited purpose. The broad aim of the study is to understand the present state of affairs in the medical colleges regarding the teaching of social sciences. The specific objectives of the study reported here were:

1. To investigate what the medical students, interns, and teachers understand by the term "social sciences".
2. To understand their perception of the relevance of social sciences.
3. To find out their attitude towards social sciences.
4. To obtain the views of the students, interns and teachers about the organisational environment of the medical colleges as a place of work for a social scientist.

Methodology

Sample

Out of the 96 medical colleges, 11 were selected to form the sample for the study. Within each college, the sample consisted of the following: (a) all social scientists, (b) all teachers in the P.S.M. department, (c) some teachers selected by random

sampling from the clinical departments, (d) students who have completed their academic course requirements, that is, the interns, and (e) students who have had an exposure to social sciences through P.S.M. teaching. In all, the sample consisted of 1,509 individuals comprising, 1,124 students, 176 interns, and 209 teachers.

Instrument of data collection

An instrument comprising several parts was developed for data collection. Each part was designed to meet one of the objectives of the study. The instrument was based on various research techniques usually employed in social sciences. The techniques used ranged from open-ended questions to the semantic differential technique.

Findings

Understanding of the term "social sciences"

One of the objectives of the study was to investigate the level of understanding of the students and teachers of medical colleges of the term "social sciences". The respondents were asked to describe what they understood by the term "social sciences". They were also given a free association test, that is, they were asked to state whatever came first to their mind when they thought of social sciences. In addition, they had to indicate whether they thought that the knowledge of social sciences was of relevance to the medical profession.

The students had difficulty in expressing clearly what they understood by the term "social sciences". The results are given below in the form of percentages. It may be noted that the percentages are not additive, as the same individual could provide more than one response. About 10 per cent of the sample did not describe the term. Those who did, gave several definitions: it is a science dealing with society (38%); it deals with social aspects (33%); it is related to analysing behaviour and interactions (14%); it is concerned with the community or public (6%). About 14 per cent thought that it was concerned

with individual's or man's behaviour or placement in the society. A few students related it to sociology (4%).

The responses of the interns were similar to those of the students. Among the teachers, 11% of the P.S.M. teachers said that it was a science dealing with society. Social sciences were also associated with the individual's relationship with society (31%); group behaviour and interaction (31%); psychology (34%); sociology (24%); anthropology (17%); economics (20%); culture (21%); customs (14%); values (7%); habits (6%); education (7%).

Among the teachers from other departments, 22 per cent considered it to be a science dealing with society; 17 per cent thought it would deal with the situations of individuals in society; 15 per cent thought it dealt with the situations of individuals in society; 15 per cent referred to "analysis of group behaviour" and "social interaction"; 3 per cent felt it was concerned with social needs, and 2 per cent related it to public health.

Relevance of social sciences in the medical profession

When the respondents were asked their opinion regarding the relevance of knowledge of social sciences in the medical profession, about 39 per cent of the students did not reply. Responses of those who replied were as follows:

Social sciences are helpful in identifying the problems of society (17%); prevention of diseases (18%); treatment of patients (14%); management of public health (5%). Interns thought that social sciences were helpful in prevention of diseases (32%); medical profession in general (31%); in identifying problems (20%); in management of public health (10%); treatment of patients (10%). The views of the P.S.M. teachers were identical to those of the interns. The teachers from other departments thought that the social sciences were useful in prevention of diseases (14%); identifying problems (12%); in managing treatment (8%); in the medical profession (8%); and in the management of public health (6%).

It may be noted that the same individual could respond in more than one category. However, the low overall percentage of responses in each category is easily discernible.

Attitude towards social sciences and further consideration of their relevance to the medical profession

It is assumed that students, interns and teachers have some favourable attitude towards social sciences in general, and towards the relevance of the study of social sciences to the medical profession. We are not suggesting that these attitudes are formed as a result of specific teaching inputs provided to the students. The study of formation of attitudes is a complex task which we have not attempted here. What seems to be important, first, is to understand what kind of attitudes the respondents have towards social sciences, irrespective of the sense in which the respondents understand the term. In the earlier section we showed that the respondents had a wide variety of interpretations of the term. Notwithstanding these notions, we wanted to explore their attitudes towards social sciences and towards the relevance of social sciences in the medical profession. We elicited further opinions on the issue through the use of structured forms. In order to understand their attitudes we thought it would be meaningful to obtain responses on a few aspects of the study of social sciences. We wanted to understand their opinions regarding whether the study of social sciences, (1) creates an interest in learning more of social sciences, (2) opens up new ways of looking at individuals in society, (3) helps in understanding people better, (4) gives a broader perspective to the use of medicine in society, (5) helps a doctor to adjust, establish, and make himself acceptable, (6) helps them to become what they want to be as persons, (7) helps the doctor to understand the patient and his environment better, and (8) we questioned whether they regarded social sciences as a science.

A questionnaire was developed comprising ten 5-point Likert-type attitude-measuring questions. The respondents were required to indicate the extent of their agreement or disagreement with a statement. Five positions were possible in answering each question: the responses were categorised as "very positive", "moderately positive", "neutral", "moderately negative" and "very negative". The responses, indicate by and large, positive and favourable attitudes towards social sciences. Table 1 shows the response pattern.

Table 1. Percentage distribution of students* by their attitudes towards the study of social sciences

Aspect	Attitude				
	Very positive	Moderately positive	Neutral	Moderately negative	Very negative
1. Interest to study more	23.50	29.71	22.81	12.89	12.65
2. Opens new ways of looking at individuals in society	27.36	15.08	22.08	17.28	14.89
3. Helps in understanding people better	36.48	35.65	13.95	6.92	5.88
4. Provides a broader perspective to the use of medicine in society	22.16	19.72	25.20	18.80	12.77
5. Helps in making a doctor acceptable	34.70	32.56	18.27	8.68	5.17
6. Helps in self-actualization	37.53	17.75	23.27	14.05	6.89
7. Helps in understanding the patient and his environment	40.36	32.07	17.71	5.41	4.10
8. Hardly any science in social sciences	31.45	17.13	24.11	13.67	11.38
9. Common sense <i>versus</i> social sciences	10.70	14.78	28.59	24.21	18.48
10. Useful in medical profession	62.60	14.14	10.75	7.16	5.23

*N=1,124 students.

Table 1 indicates that in general the students have a positive attitude towards social sciences. Students with strongly negative attitudes do not exceed 25 per cent in any category on any dimension, while students expressing positive attitudes go up to 77 per cent (62.60%+14.14%) for the dimension "usefulness in medical profession". Many of the students see social sciences as helping to understand people better, increasing the acceptability of the doctors, helping the doctor actualize himself and helping him understand the patient and the environment. The large majority of them see social sciences as very useful in the medical profession.

The attitudes of the P.S.M. teachers, teachers in other departments, and interns are presented in Table 2. It can be observed from the table that more of the P.S.M. teachers have positive attitudes to the study of social sciences than do the other teachers or interns. Interns appear to be closer to the other teachers than to P.S.M. teachers in their attitudes. About 45 per cent of the other teachers and 48 per cent of interns have indicated positively that the study of social sciences generates an interest to the further study of social sciences.

According to the respondents the attributes that give strength to the acceptance of social sciences, and also contribute to the relevance of social sciences, are: the nature and role of social sciences in helping doctors to understand people better, helping doctors become acceptable and helping in understanding the patient better. The other aspects, although they contribute to the utility of social sciences, do not seem to be very important to them. However, a large percentage of P.S.M. teachers, interns, and other teachers seem to feel that common sense is better than social sciences. It can be argued that common sense is not an antithesis of social sciences and hence love for common sense is not an indication of a dislike for social sciences. A preference for social sciences over common sense therefore, is indicative of a strongly positive attitude toward social sciences. Quite a sizable percentage of the respondents show negative attitudes (compare aspects 2 and 4 in Table 2).

Taking Tables 1 and 2 together, it can be noted that P.S.M. teachers show the most positive attitude towards social sciences

Table 2. Percentage distribution of P.S.M. teachers, teachers of other departments and interns by their attitude towards the study of social sciences.

Aspect	(1)	Category of respondents	Attitude			
			Very positive	Moderately positive	Neutral	Very negative
	(1)	(2)	(3)	(4)	(5)	(6)
1. Interest to study more		P.S.M. teachers	31%	30%	25%	7%
		Other teachers	12	33	27	4%
		Interns	18	30	26	10
2. Opens new ways of looking at individuals in society		P.S.M. teachers	39	6	13	11
		Other teachers	24	21	24	16
		Interns	19	11	22	10
3. Helps in understanding people better		P.S.M. teachers	48	39	7	16
		Other teachers	33	33	19	0
		Interns	35	28	24	1
4. Provides a broader perspective to the use of medicine in society		P.S.M. teachers	39	11	13	4
		Other teachers	27	19	27	7
		Interns	13	16	24	9
5. Helps in making a doctor acceptable		P.S.M. teachers	46	48	2	20
		Other teachers	26	26	17	1
		Interns	34	24	20	6
6. Helps in self-actualization		P.S.M. teachers	28	20	20	9
		Other teachers	34	24	20	4
		Interns	39	14	25	4
						5

(Contd.)

followed by students in general, then the interns, and lastly, the teachers of the other departments.

Meaning profiles of social sciences and social scientists in a medical college

Meaning profiles using the semantic differential technique were prepared for social sciences and social scientists in medical colleges. The mean scores are provided in Tables 3 and 4.

Table 3 Mean scale scores for social sciences

Scales	Students	Interns	Other teachers	P.S.M. teachers
Nice	+1.01	+1.36	+1.50	+1.94
Good	+1.29	+1.38	+1.39	+1.89
Rigid	+0.34	+0.39	+1.08	+1.49
Useful	+1.36	+1.18	+1.44	+1.92
Impractical	+1.57	+0.90	+1.18	+1.43
Conservative	+0.21	—	+1.05	+1.21
Precise	—	+0.80	+0.15	+0.45
Deep	+0.06	+0.04	+0.71	+1.30
Logical	+1.50	+0.11	+1.21	+1.70
Concrete	+0.04	+0.05	+0.70	+0.77
Systematic	+0.08	+0.09	+1.08	+1.45
Factual	+0.05	+0.08	+0.08	+1.36
Realistic	+0.08	+0.08	+0.91	+1.60
Descriptive	—	+0.08	-0.11	-0.83
Barren	+0.05	+0.07	+1.03	+1.06
Absurd	+0.10	+1.10	+1.03	+0.94
Relevant	+0.09	+0.09	+1.03	+1.58
Boring	+0.02	+0.04	+0.67	+0.89
Sophisticated	+0.06	+0.03	+0.58	+0.33
Solid	+0.05	+0.07	+0.58	+0.94

Social sciences: The main trend is to rate social sciences in a central position. For students and interns, social sciences are somewhat *nice, good, useful, practical, logical, and meaningful*. Ratings of these groups on other scales are very slightly towards the positive end of the scale which indicates a tendency towards neutrality or indecision.

Table 4 Mean scale for social scientists in this college

(N=1,500)

Scale	Students	Interns	Others	P S.M. teachers
Good	+0.013	+0.64	+1.16	+1.17
Dissatisfied	+0.20	+0.06	+0.25	+0.30
Efficient	+0.072	+0.17	+0.73	+1.07
Dynamic	+0.03	-0.09	+0.73	+0.57
Dull	+0.07	+0.11	+0.67	+0.19
Varied	+0.01	-0.47	+0.31	+0.20
Tense	+0.02	+0.19	+0.48	+1.02
Proud	+0.05	-0.09	+0.34	+0.36
Passive	+0.07	-0.08	+0.56	+0.30
Creative	+0.06	+0.18	+0.95	+0.87

Teachers perceived social sciences as *quite nice, good, useful, logical* and somewhat *flexible, practical, liberal, deep, concrete, systematic, factual, realistic, creative, relevant, interesting, sophisticated, and solid*.

Social scientists in a medical college: All the four groups seem to be less favourably inclined towards social scientists working in their colleges. This is especially so in the case of interns and students (Table 4).

Curricular preference of the medical students and interns

An attempt was made to study the curricular preference of the medical students and the interns by asking them to indicate their preference of the curricular subjects. Eighteen specialties were listed in alphabetical order and then rank ordered by preference. No. 1 indicated the most preferred specialty. The results are given in Table 5.

It will be noted that the first five ranks have been given by the students to medicine (1), anatomy (2), gynaecology (3), physiology (4), and microbiology (5), while the last five ranks have been given to ophthalmology (14), P.S.M. (15), biochemistry (16), radiology (17), and orthopaedics (18). The ranks given by the students and interns were correlated and the coefficient of rank order correlation ratio was 0.03 which is not

Table 5. Curricular preference of students and interns

Subject	Raw frequencies for students*			Raw frequencies for Interns**				
	preferring a subject in the first three ranks			preferring a subject in the first three ranks				
	First rank	Second rank	Third rank	Compo-site rank	First rank	Second rank	Third rank	Compo-site rank
1. Anaesthesiology	35	32	55	8	9	6	2	10
2. Anatomy	49	97	36	2	2	4	0	18
3. Biochemistry	50	8	12	16	3	5	5	13
4. Dermatology	25	30	12	11	2	4	6	15
5. E.N.T.	21	20	10	13	24	32	46	2
6. Gynaecology	33	50	102	3	30	22	22	3
7. Medicine	180	140	83	1	68	40	20	1
8. Microbiology	20	20	110	5	2	7	5	11
9. Ophthalmology	20	17	18	14	3	7	4	11
10. Orthopaedics (surgery)	20	10	10	18	7	12	12	5
11. Pediatrics	36	35	15	10	4	8	7	8
12. Pathology	36	42	60	6	10	10	6	6
13. Pharmacology	21	45	61	7	2	4	4	16
14. Physiology	75	71	24	4	7	4	3	11
15. P.S.M.	19	22	14	15	6	9	11	7
16. Psychiatry	31	13	18	12	3	3	1	17
17. Radiology	19	10	11	17	7	5	4	8
18. Surgery	22	42	53	9	7	14	38	4

*N=704; **N=156.

statistically significant. This indicates that the ranks given by the interns are statistically different from those given by the students. Interns, like students, give medicine first preference, but anatomy last reference. P.S.M. is considerably high in the ranking. It occupies the seventh position, though the number of students giving it the first three preferences is rather low.

Social scientists and the organizational environment of the college

The basic assumption that the teaching of social sciences can be done by social scientists only has been more violated than observed in the medical colleges. But even if it is supposed that medical colleges want to take social scientists into the teaching faculty, will it be possible to have them, retain them, and motivate them such that they can offer their best? It is possible that in a culture dominated by the majority, the minority will feel alienated and rootless. Sapless, they dry up in the environment. Keeping this aspect in mind, our attention was directed to enquiring into the organizational environment that the medical colleges offer to the social scientists. The organizational issues that were felt to be directly relevant were:

1. Whether working in a medical college estranges a social scientist from the mainstream of his own profession,
2. Whether the colleges provide him the opportunities to make his future for professional advancement brighter,
3. Whether the colleges provide him opportunities to innovate,
4. Whether he has any scope to contribute to the advancement of his basic professional discipline,
5. What his level of influence is in the college,
6. What his chances are to advance in his career in the college,
7. What opportunities there are for him to do things at which he is best?

The opinions of students, interns, P.S.M. teachers, and

other teachers were sought on these issues. Though they themselves are not social scientists, it was considered important to know their views since they know the organization best and they are the major constituents of the college environment. Their responses are given in Table 6.

It will be observed from Table 6 that in general the perceptions of the students, the teachers in P.S.M. and other departments, and the interns are alike. On two dimensions, namely, the issues of estrangement from the mainstream of professional life and the scope of exercising influence, the P.S.M. teachers feel more strongly than do the other respondents.

About one-third of all the respondents feel that the organizational climate of the medical colleges is such that the social scientists working in medical colleges would not be estranged from the mainstream of their professional discipline. They feel that the opportunities to make their future bright are good; that they have good opportunities to innovate and to do things they are best in and to contribute to the advancement of their basic professional discipline. Slightly less than one-third are of the opinion that the chances for advancement are also good. Only a minority (about 15 to 20%) of the respondents feel that the social scientists have any scope for exercising influence. Though one-third of the respondents consider the organizational climate as favourable, another group of one-third of the respondents consider the organizational climate in all the above-mentioned dimensions as not being conducive to the social scientists. They think that the climate of the college generates estrangement and that in general it does not provide opportunities or scope for the social scientists to contribute to their discipline. Another one-third have taken neutral stands.

The P.S.M. teachers, as mentioned earlier, stand out on two dimensions: 61 per cent consider that the environment of the medical college does not generate estrangement from the mainstream of the social scientists' profession; 67 per cent also state that the scope of exercising influence by a social scientist in a medical college is poor.

Table 6. Percentage distribution of respondents' perception of favourableness of some aspects of the organizational environment for the work of social scientists

Organizational dimension		Category of respondents				No response	
(1)		(2)	(3)	(4)	(5)	(6)	(6)
1. Estrangement from mainstream of profession	Students		38.95	25.33	31.48	2.64%	
	P.S.M. teachers		20	17	61		
	Other teachers		24	29	38		
	Interns		39	25	36		
2. Good opportunities to make their future brighter	Students		36.74	26.15	35.17	1.55%	
	P.S.M. teachers		43	22	31		
	Other teachers		42	25	30		
	Interns		41	25	34		
3. Good opportunities to innovate	Students		29.64	27.91	40.32	2.90%	
	P.S.M. teachers		39	31	28		
	Other teachers		30	35	24		
	Interns		35	19	39		
4. Positive scope to contribute to the advancement of their basic professional discipline	Students		36.80	31.37	29.02	3.00%	
	P.S.M. teachers		42	35	20		
	Other teachers		44	35	16		
	Interns		42	28	29		
5. Good scope of exercising influence	Students		22.23	23.06	51.16	3.50%	
	P.S.M. teachers		11	13	67		
	Other teachers		13	31	48		
	Interns		19	35	33		

(Contd.)

Table 6 (Continued)

(1)	(2)	(3)	(4)	(5)	(6)
6. Good chance to advance in his career in the college	Students	28.86	30.48	34.14	6.14%
	P.S.M. teachers	26	28	44	
	Other teachers	29	33	32	
	Interns	31	35	34	
7. Good opportunities to do things he is best at	Students	32.16	36.31	28.00	3.63%
	P.S.M. teachers	39	37	22	
	Other teachers	32	36	26	
	Interns	32	38	29	

*Percentages were calculated with respect to total N in a category. The percentages of non-respondents are not indicated in the table.

Overall centrality of the role of social scientists in a medical college

All said and done, how central is the role of the social scientist in a medical college? While exploring this question, we defined the two extremes of the continuum: (1) the most central position in the college refers to the group of persons who matter most in the college and (2) the most peripheral position refers to the group of persons who matter least in the college. The responses were obtained on a diagram comprising five concentric rings. The respondents were asked to indicate: (a) where he thinks the social scientists are placed today, and (b) where he thinks they should be. Results are given in Table 7.

It will be noted from Table 7 that about 70 per cent of the students, 64 per cent of the interns, 73 per cent of other teachers, and 56 per cent of the P.S.M. teachers consider the social scientists to be peripheral members in the college. In addition, about 3 per cent of students, 1 per cent of the interns, 10 per cent of the other teachers, and 6 per cent of the P.S.M. teachers consider them to be outsiders. But all the respondents think that ideally they should be more central in their positions than they are at present. This is most strongly expressed by P.S.M. teachers: 43 per cent think that social scientists should have "quite central" positions and 45 per cent think that they should have the "most central" position in the college. Adding these together, 88 per cent of P.S.M. teachers consider that social scientists should have central positions. The desideration has been expressed, but how to actualize the transformation is a big question, beyond the limits of this research.

Conclusion

The teaching of social sciences is viewed as being "nominal" in the medical colleges. In spite of several recommendations by expert groups, the achievement has not been significant. By and large, attitudes of the respondents were rather favourable towards social sciences. But in the opinion of the respondents, the medical college culture is not a congenial working

Table 7. Percentage distribution of respondents indicating positions of centrality of social scientists in medical colleges

Type of respondents and dimensions	Most central	Quite central	Neither central nor peripheral	Quite peripheral	Most peripheral	Outsider	No response
1. Students (N=1074)							
(a) Present position	4.74	9.12	14.33	19.18	49.81	2.79	4.65
(b) Ideal position	11.63	7.91	35.56	19.83	20.76	4.28	4.65
2. Interns (N=176)							
(a) Present position	6.81	10.22	13.06	36.93	27.27	1.13	4.54
(b) Ideal position	19.88	38.63	14.77	17.04	3.40	1.70	4.54
3. Other Teachers (N=156)							
(a) Present position	5.76	7.69	6.41	27.03	46.15	10.26	0.64
(b) Ideal position	17.94	43.58	7.69	16.66	7.05	6.41	0.64
4. P.S.M. Teachers (N=53)							
(a) Present position	11.32	3.77	22.64	41.50	15.09	5.66	—
(b) Ideal position	45.28	43.39	5.66	5.66	—	—	—

environment for the social scientists. The experiment to teach social sciences by medical teachers needs close review. If social sciences are to be taught by social scientists, more central, significant, and important roles for them must be created in the medical colleges. This requires organizational change.

SOCIAL SCIENCES IN MEDICAL EDUCATION

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Introduction

THE RELEVANCE OF social sciences, particularly sociology, social psychology, and social anthropology, to health fields is now widely recognized in India. Social scientists have been called upon to make contributions to such fields as health education, population control in family planning, control of communicable diseases, education and training of health workers, health planning and organization, and management of community health services including hospitals and medical care services.

The above areas of application of social sciences underline the fact that unless there is a will to bring about basic changes in the system of medical education, teaching of social sciences as such will serve little purpose; indeed it might serve a negative purpose by creating a false sense of complacency.

Social orientation of medical education

Even in the industrialized countries, medical educators were compelled to bring about major changes in the system of education to suit the rapidly changing conditions. As a result, medical education in these countries is in transition from the "Scientific Era" of the early sixties to a "Community Era".¹ Compared to the industrialized countries, the need for change

¹Prywes, Moshe, "The Balance of Research, Teaching and Service in Medical Education", *Minerva*, IX, 1971, 451-471.

in medical education in a developing country such as India was very much stronger and more urgent. In addition to the factors which were common with those of medical schools of the industrialized countries, there were a number of other important and very compelling considerations for bringing about changes in the pattern of medical education in India.

In the first place, there was the vital question of adapting the practice of modern medicine, which was evolved against the cultural, social, political, and economic setting of the Western countries, to the often diametrically different conditions that prevail in India. For this purpose it was necessary to separate "the natural science essentials" of health procedures from what can be termed as the "socio-cultural overcoatings" which had unconsciously got mixed with such procedures in the course of the growth and development of the practice of medicine in the industrialized countries. These overcoatings have little relationship to the natural science essentials and to a large extent these natural science essentials can be inserted into a new "envelope" or "coating" that will harmonize better with the social, cultural, and economic environment of India.²

Second, because of the low level of economic development in India, the extent of resources that could be made available was necessarily much less than what was possible in the industrialized countries. It was, therefore, far more important to effect economy in providing medical and health care services to people by devising inexpensive procedures and ensuring more effective utilisation of the resources.

Third, also as a result of the vicious circle of poverty and ill-health, the disease load per unit population in India was much higher. Qualitatively also the pattern of diseases was basically different from what prevailed in the industrialized countries. Medical education in India had to be tuned to contend with such massive health problems of the country as much higher rates of maternal and child mortality and morbidity, undernutrition, communicable diseases, grossly

2. Banerji, D., "Social Change and Scientific Advance: Their Relation to Medical Education", *Journal of the Indian Medical Association*, 47, 1966, 429-433.

insanitary environmental conditions, etc. For obvious reasons, high priority problems of industrialized countries such as cancer, mental health, automobile accidents, or cardiovascular diseases were to receive a relatively low priority.

Fourth, in terms of availability of medical manpower, health institutions, and equipment, India lagged far behind the industrialized countries. It was, therefore, essential that in preparing health personnel for working in India, adequate care was taken to orient the educational process to these conditions.

Fifth, since Independence, following the recommendations of the Bhore Committee³ and the Mudaliar Committee,⁴ government agencies had undertaken the major responsibility for dealing with the health problems in India. They had established an enormous network of services to provide some medical care and health facilities to the population. This pattern of health services should influence medical education.

And, finally, India had the advantage of learning from the mistakes of the industrialized countries.

Replacement of the "old stereotyped teaching of Hygiene and public health in the medical curriculum by the teaching of preventive and social medicine in relation to social needs of the community"⁵ in the fifties, can be cited as a major attempt at reorientation of medical education in India. These departments were established to act as catalytic agents to bring about social orientation of medical education in India by: (a) giving a social perspective to health problems and health practices in the country, (b) interacting with teachers of other disciplines in medical colleges to provide a social dimension to their teaching, and (c) knitting together concepts and methods of the conventional "hygiene and public health" with those from other related medical disciplines, to impart

3. Health Survey and Developments Committee, *Report*, Delhi, Government of India Press, 1946.
4. Health Survey and Planning Committee, *Report*, New Delhi, Ministry of Health, 1961.
5. National Institute of Health Administration and Education, *Report and Recommendations of the Conference on the Teaching of Preventive and Social Medicine in Relation to the Health Needs of the Country*, New Delhi, 1966.

teaching of comprehensive health services to undergraduate and post-graduate students.

Teaching of social sciences in medical institutions

The initiative for introducing social science teaching in medical colleges should come from medical educators who are interested in bringing about social orientation of medical education. They are required to define specific areas in the field of medical education where concepts and methods of social sciences can be meaningful, and to make a positive effort to interest suitable social scientists to participate in the teaching activities in medical colleges.

In turn, development of this new field of activity presents a new type of challenge to social scientists. To meet this challenge they are not only required to be good social scientists, capable of relating their discipline to the special requirements of this country, but also to be competent enough to understand the major elements of the medical education system of the country so that they can identify the special areas for social science inputs within the system, and develop social science content to cover such areas. For this purpose, social scientists are required to work closely with other members of the team of educators of physicians. This type of approach, to define the role of social sciences in medical education, helps in defining three phases in the teaching of social sciences:

In phase one, the student is required to have knowledge of some basic elements of social sciences. This would include information regarding demography, social structure and social stratification, beliefs, customs, rituals, urbanization, social change, community motivation and learning, leadership, communication, etc. It may be observed here that in acquiring knowledge concerning the community, the medical student draws from the resources of all three major disciplines of social sciences – sociology, cultural anthropology, and social psychology.

Phase two consists of making a more detailed study of certain aspects of applied social sciences which mostly or exclusively

involve health education considerations. Various facets of health education, including the factors determining community participation in health programmes, ecology of health and disease and applied demography are examples of such applied fields.

Finally, in phase three, there are areas in which social science considerations are more closely intertwined with other disciplines of medical sciences. In this case the social science teacher joins from other medical fields to form a multi-disciplinary team which gives an integrated picture of certain aspects of community health. Study of social etiology, social pathology, and social orientation of health practices is included in this category. This type of instruction can be imparted in a conjoined manner in lecture halls, in wards, and in case conferences.

Prerequisites for teaching of social sciences in medical colleges

Inadequate recognition of some of the factors which are basic to teaching of social sciences in medical education has been responsible for tardy progress in this field. In the first place, despite all the pretensions, much remains to be done in bringing about a basic reorientation of the entire medical education system in India. Second, thus far, social scientists in India have not made significant contributions in this field even by becoming members of an interdisciplinary team of teachers for the education of a physician. They have not only been found inadequate in providing the content for the teaching of social sciences to physicians, but as teachers they have also often been found wanting in communicating with medical students in such a way as to make the disciplines of social sciences meaningful to the role that these students are to play in their professional lives. Third, as a sequel to the preceding consideration, social scientists have been denied suitable positions within the faculty of medical colleges in India. And, finally, even in health institutions where social scientists have been offered positions of eminence and prestige they have not been particularly successful in justifying the expectations by conducting good research to give shape to the content of teaching of social sciences in the education of physicians in India.

CRISIS IN MEDICAL EDUCATION AND CORRECTIVE SOCIAL ORIENTATION

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BETWEEN THE MUCH-TALKED-ABOUT need to revamp medical education in the light of emerging patterns and problems and the readiness to implement the required changes there is a wide cleavage today. It would only be a repetition of the old chorus if we say that the borrowed system of medical education has deplorably failed to dovetail itself into the corpus of entirely different and totally indigenous problems. The high quality, individual patient-oriented, hospital-based approach to medical problems in terms of both training and health care delivery hardly reflects the broad spectrum of socio-cultural realities in our country, especially in rural India. The resulting impoverishment has precipitated a crisis of relevance.

A plausible corrective perhaps consists in imparting a social orientation to medical education as a prelude to the contemplated fundamental reorientation and reorganization of health services, with a view to bringing better health care to a greater number of people within the constraints of a developing economy.

Traditionally, medicine has been deemed to be an essential part of social life. However, rapid strides in medical sciences and technology and the allied phenomenon of specialization have divorced medicine from rural life. This becomes all the more apparent when the approach and philosophy of modern medicine are studied in comparison to those of indigenous systems. What we need is the evolution of a new system that will integrate the advantages of modern medicine with the singularities and local characteristics of our people. A

beginning in this direction must be made at the level of medical education.

The absence of social orientation is pronounced in our approach to the various facets of health care – whether training, service or research – wherein we lose sight of the “consumer” for whom they are meant.

The present system of training does not prepare the doctor professionally or mentally to readily accept the health challenges that rural India poses from time to time. He discovers nothing in common between himself and his milieu. This absence of harmony tells upon his efficiency both as a community leader and as a leader of the health team. Feeling crippled by the real dearth of facilities, which look magnified in comparison with the “ivory-tower” training situation that he had, he gives up hope of being successful or effective in the new set-up for which he has been trained. The fact is that rural India with all its limitations and challenges requires great professional expertise and presence of mind to improvise realistic ways of tackling everyday problems, a vast number of which will usually be overlooked in any planning of welfare activities or health service programmes.

The story of health services is not any different. The titanic efforts that we put out in the two decades following independence to ensure our reaching basic health care to the community have at best been a middling success. The ideal of parity in qualitative standards of health services for the rural and urban populations is yet to be achieved. The gulf is only widening. Our national drives towards control or eradication of communicable diseases or curtailing population growth have not brought about the desired results. Considering all these, it is not surprising that we are facing an unprecedented crisis in the field of public health.

Medical research in this country has always been plagued by a sense of wrong priorities. A belated attempt to reallocate priorities so as to find realistic solutions to our health problems, be they related to pestilential or mass diseases, rural housing and sanitation, stemming the tide of population over growth, or ensuring minimum health care to the periphery, has to be initiated.

The relevance of social sciences to the training, service, and

research aspects of Health should be viewed against this perspective. The nominal emphasis that is given to social sciences through a limited number of didactic sessions without sufficiently relating it to the health sciences cannot take us anywhere. The usual practice followed in our universities is to relegate the teaching of social sciences to an insignificant position almost cut away from the frontiers of medical training. Very often the important responsibility of discussing the multifactorial etiology of disease or the relevance of social factors in health and disease especially the social consequences thereof is entrusted to novices in the field who have hardly any practical experience, with the result that the desired impact on the trainees is seldom achieved. That social sciences are only given perfunctory importance is evidenced from the fact that their teaching is often limited to the pre-clinical phase, and that too in the form of a few lectures. The central contradiction of this total situation emerges at once when we recognize the fact that all the while the trainee at this stage is confined to a narrow world of cadavers and animal experiments, and far removed from the real warmth and sunshine of societal life. The point is, that the time has come to standardize the status of social behavioural sciences, and to make its teaching the responsibility of qualified hands with substantial experience in the health field. It is necessary not only to encourage young social scientists to assume their rightful roles in the field of medical education, but also to ensure opportunities for their professional growth and career development.

The incorporation of social sciences in the undergraduate curriculum must not be restricted to any particular phase but should be continued throughout, ensuring their meaningful integration. Here it is desirable that health professionals with the right orientation, rather than theorists (whether drawn from the hospital, the health centre, or the community), be increasingly involved in the process.

There should be no doubt left of the fact that the quantitative augmentation of the contents of social and behavioural sciences in the undergraduate curriculum does not mean anything unless it is meaningfully related to the life situations in the community. The hospital, therefore, is not the end-all of

training, but is only *one* of several settings. The hospital at the same time should be considered as a "Social Institute" that exists in the mainstream of life and not just a repair workshop. It is imperative that we train our prospective physicians for a comprehensive understanding of men, existing even in the twilight zone of the singularities of a given society. Only then shall we enable them to fully appreciate the non-biological determinants of health and disease in the totality of medicines. It is apparent in this context that an adequate emphasis on the relevance of socio-behavioural sciences can only facilitate this balanced approach. It is obvious, too, that the present system of medical education provides little scope for this. And this, in spite of the recommendations by several important advisory committees on medical education in this country. It may be reiterated that socio-behavioural sciences have much to contribute to the overall enhancement of medical education in this country by clearly bringing out the psychological dimension of the doctor-patient relationship and by incorporating and emphasizing the social and cultural determinants of health.

A closer collaboration between medicine and social sciences can and must create a new image of the physician far different from the "human technician" of today. Social sciences can enable medical education to be man-centred rather than organ-centred. Our stumbling block hitherto has been that in both training and practice we left out "man" and "society" and concentrated myopically on the disease itself. The image of the ideal physician that we want to realise presupposes the fact that his responsibilities should extend beyond the confines of the clinic.

This requires, as was suggested at the outset, a thorough re-orientation of the present system of medical education. But it must be admitted that an adequate understanding of the multitudinous relationships between medicine and socio-behavioural sciences is altogether hypothetical at the moment. And that brings us to the crux of the problem. A strong research unit to investigate the meeting grounds between medicine on the one hand and socio-behavioural sciences on the other must be established, lest we commit the wonted folly of borrowing research findings from advanced countries that are totally irrelevant to the Indian context.

A happy collaboration between medicine and socio-behavioural sciences at various levels can humanize, enhance, and revitalize the teaching and practice of medicine in the Indian context. Only a timely corrective will give a new direction away from the dead-end to which medical education appears to be advancing. Looking from the here and now this seems to be the only way to realize the image of the ideal physician for India.

APPENDIX

Training in Community Medicine for Undergraduates at the All-India Institute of Medical Sciences

True to its commitments, and sensitive to the health needs of the country at large, the All-India Institute of Medical Sciences made an attempt to revise the undergraduate curriculum so as to impart the relevant orientation to its undergraduate trainees. It was felt that nothing short of a community orientation would suffice and this realization has been reflected in the modifications made of late. Consequently, the institutional goals for undergraduate training have also undergone a change. From the hospital based, individual-centred patient care, the emphasis in undergraduate medical education at the Institute has veered to community-centred health care delivery within the given set-up. The implications of this shift in emphasis are manifold, and they have been accepted in principle, and are being implemented. This requires a number of traditional areas in the undergraduate curriculum losing their wanted pride of place as they give way to newer and more appropriate measures *vis-à-vis* the community's needs. What is emphasized in the new curriculum are for example the regional and local health patterns and problems and feasible ways of tackling them within the available resources and manpower. The primary focus is on the rural consumer. It is this climate of opinion that created the need for the establishment of a centre for community medicine in lieu of the traditional department of preventive and social medicine. Closer, more meaningful collaboration between the community health expert and the clinician will henceforth be possible in the three major fields of training, service, and research related to community health. The three component parts that constitute the main body of community medicine are:

(a) Basic sciences relevant to community health: Biostatistics,

sociology, communication sciences, epidemiology principles of public health administration.

- (b) Applied community health: Environmental health, public health, nutrition, maternal and child health, occupational health, health education, health administration including national health programmes.
- (c) Principles of community health and preventive medicine as applied to clinical medicine.

The training strategy

The wrong priorities in undergraduate training have now been recognized for what they are. The erstwhile practice of postponing the interface between the undergraduate and the community which he is expected to serve, to the final phase of his training in a medical college has been largely responsible for the pronounced absence of community health orientation in the student. The present training strategy offers a corrective by increasingly involving the student in active community health practice right from the beginning of his studentship.

The emphasis is further extended by offering community based training with greater allocation of curricular time, major modifications in the approach and content of the training course and adequate weightage in the internal and professional assessments. Other noteworthy features are the introduction of a multidisciplinary approach in our training efforts and the role given to the personnel in the health care delivery system.

The principal objective is to provide a graded experience to the undergraduate student in the three phases of the undergraduate curriculum, that is, pre, para, and clinical, while didactic type of instruction on the three components of community medicine detailed above are spread throughout the course of study. Comprehensive community practice experience is being offered in various settings, namely, the family, the urban/rural health centre clinics, and the village.

The student assignments are in the form of :

1. Family care practice
2. Junior clinical clerkships in a community setting (urban

health centre) in the para clinical phase, (5th/6th semester)

3. Senior clinical clerkships in a community setting in the clinical phase, (7th/8th semester and 9th semester).

Family care practice

Under this heading a first semester student is allotted a couple of families in the urban health centre setting (three families for a team of two students) for continuous follow up during his studentship. The objective is to provide him direct and first-hand experience of health and disease in the natural domestic milieu. More importance is given to enabling the student to come to terms with the shifting panorama of events and the twists and turns of the domestic climate so that he may be at one with the type of families for which he is being prepared. Problem families are usually avoided, as the objective is to demonstrate the pattern of normalcy in our setting. The only invariable selection criterion is the presence of a growing child. The training programme is carefully graded to match the increasing professional capability of the student at different stages of his training. This ranges from functioning under the tutelage of a preceptor to assuming full responsibilities for the given situation in the final phase.

Junior clinical clerkship in the community setting (urban health centre)

Commencing at the para-clinical phase, the student is posted in the urban health centre for a period of 12 weeks. In a setting widely different from the traditional teaching hospital, the student at the urban health centre is introduced to the common morbidity pattern, and made to explore the underlying environmental and socio-cultural factors. Clinical methods are taught against this background and bedside as well as investigative procedures practised. The emphasis is on "generalist" practice and cases that need "specialist" services are referred to the teaching hospital. The working assumption during this posting is that the total family (as against the individual) is the unit of observation.

Community and family aspects: Opportunities are provided for acquiring the necessary skill in approaching a family, establishing rapport and obtaining relevant information.

The student must identify the situation at the clinic where a visit to the family is likely to be of use. Such a visit may also clarify the impact of illness on the family, or even on the community.

It is hoped that with this broad perspective of the total problem, the student will be able to utilize a comprehensive and more effective regimen of management.

Senior clinical clerkship in the community setting (rural health centre)

Posting the senior clinical students in the rural health centre constitutes a fitting finale to the progressive community orientation initiated in the early phase. This posting has two broad implications. Here the student is called upon to assume clinical responsibilities in the rural hospital/health centre/sub-centre/setting. Then he is required to function as a community physician with the village as the unit of observation. It is here that the student can cultivate those qualities in approach and attitudes that will ultimately determine his success in any community setting.

In the rural hospital/health centre setting he is provided with guided experience in diagnosis and management of common illnesses in the out-patient department and wards.

In the village setting he is initiated into the practice of community diagnosis and therapy. Here he identifies his future role as a reader of the health team in a given setting. He gets ample opportunities for studying local health problems, the felt and unfelt needs of the community, and the implementation of the health care delivery system at the periphery, including the national health programmes.

The preceptorial role is assumed by a team consisting of members from the major general clinical disciplines and the centre for community medicine, assisted by health personnel from the local health team.

GENESIS OF SOCIAL SCIENCES IN MODERN MEDICINE - A CHRONO- LOGICAL SURVEY*

Somnath Chattopadhyay

MOST OF THE CHARGES and innovations in medical education that we see today date back to recommendations made in 1946 by the Health Survey and the Development Committee (Bhore Committee). The Bhore Committee, while reviewing medical education, observed that there was a gross shortage of doctors as well as trained teachers in medical colleges in the country. After noting the limitations of resources available in the country, the Committee suggested that temporary provisions should be made to produce less-elaborately trained doctors, while simultaneously concentration should be on producing highly trained doctors who would be what they called a "basic doctor". They suggested that the training of the "basic doctors" should include, as an inseparable component, education in the community and preventive aspects of medicine. In order to improve the health care facilities in India, the Committee suggested that the undergraduate medical curriculum should be reorganized and post-graduate departments be started to produce qualified teachers to teach the undergraduates. The following are some of the other recommendations:

(a) Reduction of the hours of didactic instruction in subjects such as anatomy and physiology, and the inclusion of principles and methods which will enable the student to learn for himself, think, observe, and draw conclusions.

(b) The establishment of a department of preventive and social medicine in every college so as to give the student an

*I wish to express my sincere thanks to Dr. T. Venkateswara Rao, Indian Institute of Management, Ahmedabad, for allowing me to share his ideas and materials in writing this paper.

insight into health problems through contacts with home and community life.

A special feature of the Bhore Committee's recommendations was the realization of the importance of teaching and training the doctors in preventive as well as community health aspects of medicine. It was for this reason that they suggested the creation of departments of preventive and social medicine and stressed that every subject should be taught with emphasis on the preventive and social aspects of medicine. This formed the starting point of efforts made in the medical education scene to orient the young physician to community problems, preventive services, and community medicine.

After the recommendations made by the Bhore Committee, the Government of India showed an increased interest in giving an orientation to the young physicians in the preventive and community aspects of health. The World Conference on Medical Education held in 1953 also stressed the importance of giving the physician training in the preventive and social aspects of medicine. The first high-powered National Medical Education Conference (also known as the First Conference of Deans and Principals of Medical Colleges) was planned to be held in 1955. In early 1955, the Rockefeller foundation arranged a Conference in New Delhi on "Teaching of Preventive and Social Medicine in Medical Colleges in India", with a view to helping the Government of India prepare for the National Conference. The following are the points of consensus of the group.

- (a) Full departments of preventive and social medicine should be started in medical colleges with an experienced and well-trained professor who has a clinical background and can make the department equal to the level of the other major departments of the medical college. The Professor should be supported with at least one assistant professor and a statistician apart from the other persons needed during field practice.
- (b) The teaching of this subject should be spread throughout the 4 or 5 years of medical studies.
- (c) A total of 50-80 hours during the pre-clinical training and a total of 60-80 hours during the clinical years should

be reserved for teaching this discipline. The recommendation was that the pre-clinical curriculum should consist of philosophy of preventive medicine or human ecology (20-30 hours), clinical conferences (10-20 hours), and medical statistics (20-30 hours). The clinical curriculum should consist of environmental hygiene (15-20 hours), principles of epidemiology including communicable diseases and vital statistics (20-30 hours), community health organization and services, including maternal and child and other specialized fields (20-30 hours).

- (d) To inculcate a spirit of prevention and to develop a community bias in the student, well-planned field experience should be provided to him through assigning him as a family doctor and making him serve as a liaison between the family and the hospital. Participation in health surveys, dispensary care and efforts to meet the social needs of a community should constitute an essential part of field experience. Follow-up of discharged patients, family investigations for cases such as tuberculosis, typhoid, etc. organization of student health services, are also some other forms of field practice that can be provided by this department.
- (e) There should be coordination between the teaching of paediatrics, psychiatry, and preventive and social medicine (P.S.M.).
- (f) It would be desirable to have a separate written examination paper in this discipline.
- (g) Lastly, the teachers of P.S.M. should be of outstanding ability and skills so as to bring up the prestige of the department and to coordinate with the other departments in a continuous struggle to achieve the objective of preventive and curative services.

A number of reference materials were presented at the Conference from which one can seek to clarify the definition of P.S.M. and to differentiate it from public health. The oft-quoted definition of P.S.M. mentioned in several of the papers presented at the Conference, was the one by Leavell and Clerk, which also attempts to differentiate P.S.M. from public health. The definition says that preventive medicine is "The science and

art of preventing disease, prolonging life and promoting physical and mental health and efficiency. This definition applies to preventive medicine as practised either by a private practitioner dealing with his individual patients or the public health officer with aggregations of individuals in his community. Public health may then be considered a sort of division of preventive medicine, the part which requires organised community efforts or action." All the other presentations at the Conference stressed the importance of teaching this subject and felt that it was high time that the Indian medical colleges took necessary steps in this regard.

Against this background, the first All-India Conference on Medical Education held in 1955 strongly recommended that :

- (a) P.S.M. Departments should be created in each medical college with full time staff.
- (b) Teaching of this discipline should run from the first year through all succeeding years.
- (c) The syllabus should include 160 hours of pre-clinical teaching in which human ecology, clinical conferences, biostatistics, field surveys, etc., should be taught; 230 hours during clinical teaching in which environmental hygiene, epidemiology, community organisation, and public health should be taught; field experience should start in the second or third year with the student working as a family advisor with rural work projects in coordinating O.P.D. services.
- (d) The teaching of the P.S.M. department should be integrated with the teaching of all the departments in medical colleges. A coordinated out-patient service may be developed in which students, accompanied by medical workers, do follow up on patients at their homes. This would help to study the social, environmental, and other factors relating to the patient's illness. Other concerned departments such as medicine, surgery, paediatrics, psychiatry, etc. should also participate in the study jointly. This should be followed by a seminar in which the concerned departments participate.
- (e) Rural and urban health centres should be associated

with the department. These would form the laboratories where practical experience can be acquired by the student and where studies in community health problems can be promoted, the student being encouraged to participate in such studies. The P.S.M. department will be incharge of these organizations.

- (f) The rural health centre should provide the necessary facilities to these students.
- (g) There should be a separate examination in preventive and social medicine.
- (h) An elementary course in statistics should be provided for all students in the pre-clinical period. The experimental data from field surveys and laboratory work, especially on physiology and pharmacology, should be utilised for practical training.
- (i) An elective course in statistics should be included in clinical years with epidemiology being associated with it.

All these recommendations point to the great need felt by the medical educationists at that time to teach preventive and social medicine and to prepare the "basic doctor" as suggested by the Bhole Committee. Besides recommending 290 hours of teaching the science of P.S.M. as against the maximum recommended 160 hours by the Conference organised by the Rockefeller Foundation, the Medical Education Committee went to the extent of recommending that mathematics, logic, psychology, English and elementary genetics should be taught in the pre-medical courses so as to give a good foundation for the preparation of the basic doctor. Of course, how far these have been implemented is a different matter. Besides the importance given to the teaching of P.S.M., the other recommendations worth noting are:

- (a) A separate department of paediatrics should be established in each medical college. A period of not less than three months should be devoted to the study of paediatrics which should include neo-natal paediatrics, and the growth and development of the child.
- (b) Psychological aspects of medicine be emphasised by teachers of subjects such as embryology, physiology, medicine,

surgery, obstetrics, gynaecology, and paediatrics. Psychiatry should include 10 lectures on psychology for second year students, 10 lecture demonstrations on personality in the third year, and 12 lecture demonstrations on what constitutes a good mental hospital.

- (c) Experimentation with different types of examination systems be tried out in place of the present stereotyped examination system.
- (d) A teacher-student ratio of 1:5 should be aimed at.

The Indian Public Health Association held a symposium on "Rural Health" 1956 and the panel on Rural Health Services and Public Health Manpower, noting the rural health needs of the country, recommended that comprehensive health care should be provided for the rural areas, integrating promotional, preventive, curative, and rehabilitative activities through health centres where not only *physical* but *functional integration* was ensured and the highest emphasis was laid on preventive services. To achieve this goal of providing comprehensive health care and promotional health services, besides other recommendations, the panel has suggested that:

- (a) Colleges of nursing be established in as many States as possible and nurses be trained in hospital management.
- (b) Two institutions for post-graduate training in public health and its specialties be started on the lines of the All India Institute of Hygiene and Public Health.
- (c) Medical graduates should be recruited to the State cadre. After working for certain periods in the larger hospitals under seniors they should be posted for a definite period to rural areas and thereafter be provided with opportunities to work their way back to larger institutions or to specialize in any field they would like.
- (d) That a chair of P.S.M. be established in every medical college without any further delay and that a rural and an urban health unit be developed in association with it. Training in P.S.M. should begin from the time the student joins the medical college.
- (e) With a view to keeping the workers in the public health field conversant with rapidly advancing knowledge and

the changing trends in public health science and techniques, measures should be taken to organize in-service training, group meetings, seminars, and refresher courses on a regional and national basis.

A symposium on "Teaching of Preventive and Social Medicine in undergraduate colleges of India", was held in the scientific session of the Annual Conference of the Indian Public Health Association with a view to acquainting the government universities, and institutional authorities with the problem of teaching P.S.M. to undergraduates. The members observed that in spite of the stress given to this subject by the Conference organised by the Rockefeller Foundation and the First Medical Education Conference, many institutions had not implemented the recommendations of starting P.S.M. departments. Hence, they resolved that the same should be started immediately with a minimum full-time staff consisting of a Professor, his assistants and the ancillary staff, namely, medical social worker, public health nurse, biostatistician, and laboratory technician. Besides making other recommendations that were very similar to those of earlier conferences, the members gave special importance to teacher training and recommended that teachers should be sent abroad for higher training to enable them to run the P.S.M. departments efficiently. Post-graduate and other training centres could also be established in the country so that the teachers could be trained locally in terms of the needs and the background of the conditions prevailing in the country.

The same ideas have been stressed in the discussions of another Conference on "Teaching of Preventive and Social Medicine and Public Health" held in October 1958 at Calcutta organized by the Government of India.

In March 1958, the Government organized a Medical Education Conference with a view to reviewing the teaching manpower problems in medical colleges and ways and means of solving these problems. The Conference had recommended revised scales of pay, training of medical teachers, and other ways of overcoming the problem of shortage of teachers. As the Conference's objective was limited, it did not go into the details of the medical curriculum, etc.

The same is true of the Conference of Deans and Principals of Medical Colleges held in 1960, also known as the Second Medical Education Conference. This Conference considered the problems of medical education such as cost of medical education, shortage of teachers, evolving a curriculum with a coordinated programme of research, failure rates in medical colleges, integration of pre-medical courses in medical colleges creating a separate wing for medical education and research, organization of refresher courses for private practitioners, co-ordination between colleges and exchange of teachers, methods of stimulating research, strengthening of teaching hospital units and selection procedures for college admissions.

The sub-committee of the Conference, which discussed the evaluation of the existing curriculum, observed that many of the colleges had tried to implement the recommendations of the Medical Council of India following the 1955 Conference but could not do so to the full extent due to the limited resources available and the lack of teaching staff in subjects such as sociology, statistics, etc. The committee could not suggest anything more on these issues as it felt that more time should be allowed to see how far the experiments started were proving fruitful.

The Conference passed resolutions on three items. It recommended that:

- (a) A special set-up be established in various States and in the Central Government to deal with problems of medical education and research.
- (b) Refresher courses be held for private practitioners wherever possible.
- (c) Efforts should be made to further expand research activities in all teaching institutions and additional staff for research should be provided in each college to take part in the teaching programmes of the departments.

The Health Survey and Planning Committee (Mudaliar Committee) in 1964 while reviewing the conditions of medical education in India pointed out the following defects in medical education as hindering progress:

- (a) Insufficient knowledge of English, pre-medical sciences, and humanities, overcrowding in the medical colleges, and defective methods of selection of students.
- (b) Lack of properly qualified teachers, especially in anatomy, physiology, pharmacology, pathology, and biochemistry.
- (c) Students are grossly overexamined and undertaught. The medical colleges do not provide proper facilities, staff, and equipment.
- (d) Internship training is very inefficiently organized.

Some of the important recommendations made by the Mudaliar Committee included:

- (a) There should be 18 months of pre-clinical training with subjects of study in anatomy, physiology, biophysics, organic chemistry, and bio-chemistry.
- (b) There should be 3½ years of clinical study with introductory statistics, psychology, and sociology in the first six months.
- (c) There should be a reduction of the didactic lectures and intensive coaching by staff including the junior staff.
- (d) Orientation in public health be given to students by the P.S.M. Departments.
- (e) Time of watching complicated surgery be reduced.
- (f) Increased importance be given to paediatrics, P.S.M. and mental diseases.
- (g) One year of compulsory housemanship after the final examination, three months of field training in public health.
- (h) Orientation in rural health.
- (i) Greater emphasis on teaching in O.P.D. to students.

Apart from these, the committee had also put up a number of other recommendations such as increasing medical colleges, recruiting trained teachers, improving the post-graduate studies, granting stipends and fellowships to post-graduate students, etc.

Noting the trends in medical education and with the aim to help improve the quality of medical education in India, a voluntary association called the Indian Association for the Advancement

of Medical Education was set up by Dr. Mudaliar in 1961. The Association started its activities in the form of conferences.

The undergraduate curriculum sub-committee of the Medical Council of India submitted a number of recommendations on undergraduate medical education in January 1961, which were accepted by the executive committee in February, 1961. The notable features of these recommendations were:

- (a) That a minimum of 5 years of study be prescribed in the medical curriculum in addition to the internship.
- (b) Throughout the 5 years of study of the pre-clinical and clinical courses, the teachers should direct the attention of the students to the preventive aspects of medicine and to measures of promotion of positive health.
- (c) The pre-clinical course should include dissection of some parts of the body and demonstration of dissected parts of the entire body while teaching human anatomy and physiology. New subjects (i) introduction to statistics, (ii) normal psychology, and (iii) introduction to social medicine and environmental factors pertaining to health, should be introduced.
- (d) Emphasis should be laid on practical training, seminars, and conferences and attention of students should be drawn to preventive and social aspects of medicine.
- (e) New topics were suggested in pathology and bacteriology, medicine, surgery, midwifery, diseases of women, and infant and maternal welfare. Stress was laid on the experimental and practical background given to students in these subjects. It was also suggested that lecture-demonstrations, seminars, and conferences in clinical medicine and clinical surgery should run concurrently.
- (f) Preventive and social medicine should also be taught in the clinical curriculum. The Committee did not spell out the topics to be included under this subject.
- (g) Another notable feature of the recommendations is that, though the Committee had strongly stressed the importance of P.S.M. it had provided for examination of the students in this subject in the final examination only, and that too not separately, but under "medicine".
- (h) Post-examination training for a period of 6 months after

the final examination was recommended of which 10 months should be in public health, preferably in a rural area. The post-examination training should include training in family planning. The family planning centres should be attached to medical colleges or recognized health centres.

Two resolutions were also passed by the Committee. These were placed by the President of the M.C.I. along with the other recommendations, for consideration at a Conference of Teachers of Medical Colleges from all over India, which was held in November 1961. The resolutions read:

- (1) "Resolved that the teaching in Social and Preventive Medicine in all aspects shall necessarily begin right from the beginning of the Medical curriculum and continued till the end of the final year and resolved further that universities be requested to remodel the courses of studies in Medicine in accordance with the above."
- (2) "Resolved that introduction of medical students in out-patient and in-patient departments of the hospital be encouraged from the very beginning of their medical studies in order to stimulate their intrinsic interest in their responsibilities and to widen their outlook as regards the sick."

The recommendations and resolutions were put before the Conference of Teachers of Medical Colleges organized by the M.C.I. in November 1961. The members of the Conference passed all the recommendations with the major changes that:

- (a) The pre-clinical course should be of 2 years instead of the suggested $1\frac{1}{2}$ years, and the clinical course should be of 3 years instead of $3\frac{1}{2}$ years.
- (b) The possibility of extending the post-examination internship from 6 months to 1 year be explored.
- (c) There should be a separate examination for (i) Preventive and Social Medicine, (ii) Ophthalmology. The Surgery paper should include a question in E.N.T.

Some other minor modification on differential stress to be

laid on various aspects of practical training were suggested and the conference also passed the first resolution about teaching P.S.M. from the beginning. The members of the Committee also recommended that there should be both vertical and horizontal integration in teaching the preventive and social aspects of medicine. Though these suggestions emerged out of the Conference, the M.C.I. could not immediately finalize and adopt the recommendations due to the Chinese aggression in 1962. Meanwhile in 1962, the Indian Association for the Advancement of Medical Education held a conference which focused on the importance of teaching P.S.M. in the medical curriculum. By 1964, when the Chinese aggression ended, the M.C.I. could review the recommendations and in November 1964 it adopted them. While adopting these recommendations the Council took note of the suggestions that emerged in the 1961 November conference and the changed situation after the Chinese aggression. The notable changes in the adopted recommendations are:

- (a) Condensing the medical course to $4\frac{1}{2}$ years with $1\frac{1}{2}$ years of pre-clinical and 3 years of clinical teaching instead of the original 5 years.
- (b) Addition of paediatrics in the clinical subjects, with a provision for a 3 months' clinical clerkship simultaneously during the clinical course.
- (c) Giving medical colleges freedom to conduct examinations in P.S.M. separately or along with medicine. This was modified in 1965 and a separate examination was recommended by the Council.
- (d) A separate examination in midwifery and gynaecology.

Nothing has been mentioned about the post-examination internship training. However, in the recommendations adopted by the M.C.I. in 1965, it specified that every student should undergo 12 months of rotatory internship after passing the examinations. This should include 3 months each in medicine, surgery, public health work in rural areas, and obstetrics and gynaecology. A part of this period can be spent in any other elective subject, with the recommendation that:

- (a) A minimum of 50 hours be devoted to the teaching of

P.S.M. during the pre-clinical period. Personal hygiene, biostatistics and vital statistics, human ecology, elementary psychology, elementary social science, normal growth and development, nutrition and dietetics should be taught during this period. Some of these could be taught in collaboration with the departments of biochemistry and physiology and the departments of P.S.M.

- (b) A question on P.S.M. be included in the first professional examination along with any one of the pre-clinical papers.
- (c) 250 hours of teaching should be devoted to this subject in the clinical years. This includes lectures, demonstrations, seminars, conferences, field visits, and practicals. The subjects suggested for these 250 hours were: (i) medical statistics; (ii) environmental hygiene; (iii) parasitology, helminthology, and entomology in relation to communicable diseases, their prevention and control; (iv) public health administration; (v) advanced courses on nutritional deficiencies; and (vi) preventive and social medicine with clinico-socio pathological conferences with other departments such as medicine, surgery, obstetrics, and gynaecology, to give the student an integrated approach to medicine. To study disease in a comprehensive manner, an epidemiological unit be set up in the O.P.D. of the teaching hospital to enable the students to understand the social, economic, and environmental factors in relation to illness. Principles of health education and family planning also should be taught. Every student should be required to submit one satisfactory written history of community health undertaken under the guidance of the staff of P.S.M. in a rural area, and a case history of a patient followed up with the assistance of the epidemiological unit.
- (d) As against the earlier recommendations adopted in 1964, the Committee revised its decision regarding the examinations for P.S.M. and adopted the resolution that there should be separate full examination in P.S.M. in the final year.
- (e) The rural internship of 3 months should concentrate on (i) administrative aspects orienting the student to the organization of local self-governments, concept of

para-medical health workers such as the health visitor, vaccinator, sanitary inspector, health educator, etc., dynamics of the community, the national health programmes, and community structure; (ii) preventive aspects orienting him to organization and management of comprehensive health care, keeping adequate statistical records, effective utilization of resources in the community for promotion of health programmes, the social effects of illness, etc., and (iii) clinical aspects to sharpen his diagnostic capacity with limited resources, permit him to take responsibility of minor illnesses and surgical complications and to indicate his limitations and realization of when to call for consultative services or a referral. Community participation of the students should be encouraged and minimum facilities be provided to them during their stay in the rural area.

The Council has spelled out the details of the syllabus including the number of hours to be devoted for each topic.

While this was how developments were taking place with reference to undergraduate medical education and the attempts to make it community-oriented with a stress on prevention of disease and promotion of health, attempts were also being made concurrently by the Government of India and the M.C.I. to improve the standards of post-graduate medical education. Their emphasis has been to increase the standards of post-graduate medical education so that better teachers are produced who will in turn become "basic doctors".

Another Conference of the Deans and Principals of Medical Colleges was held in November 1962 to consider and review post-graduate medical education with special reference to existing facilities, standardization of nomenclature, admissions, examinations, failures, deficiency of teachers, emigration abroad, shortage of specialists, etc. Most of the discussions centred round working out ways and means of facing the emergency situation created at that time, such as by producing as many doctors as possible. For this the Committee endorsed the M.C.I.'s recommendation that the duration of the M.B.B.S. course should be for $4\frac{1}{2}$ years only with increased number of working days. They even went to the extent of

saying that it could be made 4 years if the number of working days were increased. Another item of interest discussed at this Conference was the control of Primary Health Centres by a university or a medical college for their proper management. The Committee felt that it might not be possible to implement this proposal in view of the fact that there would be about 5,000 Primary Health Centres by the end of the Third Five Year Plan as against only 44 medical colleges (out of 70) which had separate P.S.M. departments. In 6 more they were being planned. Apart from this, no special attention was given to post-graduate medical education in community health.

In November 1964, the M.C.I. convened a larger conference at which the Post-graduate Committee formed by the M.C.I. presented the reports of the post-graduate curriculum, admission requirements, etc., for each discipline. At the same Conference, details of M.D. in P.S.M. were also discussed, based on the report presented by Dr. Chablani. The objectives of the department as enumerated in the report included:

- (a) to produce teachers
- (b) to produce research workers
- (c) to develop an effective pattern of teaching this discipline and its practice in the community
- (d) to produce administrators conversant with health administration.

The course recommended included the subjects:

- (a) Basic sciences including growth and development, mental health, social sciences and social psychology, nutrition, biostatistics, epidemiology and applied microbiology.
- (b) Preventive medicine at individual level including the personal health services covering the entire cycle of human life.
- (c) Preventive and social medicine at community level including administration of health services, community health and comprehensive medical care, patterns of medical care (national and international), nation's health and socio-economic problems, environmental health and occupational health.

- (d) Preventive and social medicine at individual and community level including communicable diseases, non-communicable diseases, health education and pedagogy, family planning, applied paediatrics, gynaecology, midwifery, and rehabilitation.
- (e) A thesis.

The staff recommended included one professor, one associate professor of applied social sciences, one assistant professor of community medicine and health administration, one demonstrator, two medico-social workers, two public health nurses, one laboratory technician, one assistant professor of environmental health, one senior sanitarian, one assistant professor of statistics, one research officer, two statistical assistants, one reader or registrar in the family planning unit, two social workers, one public health nurse, one health educator, one projectionist, one modeller, one draftsman, and in rural health centres, one lecturer, one lady medical officer, one social worker, one public health nurse, one sanitarian, and one laboratory technician. The equipment recommended included a health education unit, statistical unit, family planning unit, and a rural and urban health centre with two jeeps for transport purposes.

The conference also had a section where a symposium on undergraduate medical education was organized in which a few papers were presented. Again stress was laid on teaching P.S.M. in the undergraduate medical curriculum. However, no resolutions or recommendations were made in this symposium.

The National Institute of Health Administration and Education (N.I.H.A.E.) was set up in 1964 to fulfil the growing need for facilities to carry out high level training and research in health administration and Education. The broad objectives of the institute include providing education and training in principles and practice of public health administration through doctoral, staff college, and orientation courses and seminars, as well as to conduct research on administrative and educational problems.

In September 1965, the N.I.H.A.E. organized a Conference in New Delhi to consider the teaching of preventive and

social medicine in relation to the health needs of the country.

- (a) The Conference accepted the curriculum recommended by the M.C.I. in 1964, and urged that all the universities should adopt the same immediately.
- (b) The Conference also recommended the teaching of industrial health problems and a broad teaching of entomology (with the help of the department of microbiology) along with the other topics recommended by the M.C.I.
- (c) The topics on genetics, eugenics, and psychology may be taught in collaboration with the university departments.
- (d) There should be a separate full examination in P.S.M.

Considering the health needs of the country it was felt at this Conference that students should be trained to provide comprehensive health care. For this, it was recommended that:

- (a) Patients in the hospitals be used by P.S.M. departments.
- (b) Medico-social units be established in O.P.D.s to study social and epidemiological aspects of disease extended into the community.
- (c) The social and environmental history, type of services available and used by the patients be recorded while taking the history.
- (d) Family follow-up of case studies be carried out in collaboration with other departments.
- (e) Clinico-social conferences be organized in collaboration with clinical departments to demonstrate the social etiology of disease, natural history of disease process, levels of prevention that can be practised, and the clinical and preventive approach that can be taken to deal with the problems of the community.
- (f) Minimization of didactic lectures and use of group conferences, symposia, and lectures by the department, in collaboration with others.
- (g) Student health services be organized on the campus of the university or college.

- (h) The students be made familiar with health services provided in the community.

The Conference also recommended the establishment of a coordinating committee made up of all the heads of departments to look into the methods of effective utilization of resources available in this department.

Joint teaching should be undertaken with the clinical departments in teaching communicable/non-communicable and infectious diseases and with the departments of paediatrics and obstetrics in teaching neo-natal paediatrics. Combined teaching should also be done with pre-clinical and para-clinical departments when and wherever possible and needed to give a preventive and social bias to students.

The Conference also made detailed recommendations for the staffing patterns of this department. These recommendations are similar to those made in the 1964 Post-graduate Medical Education Conference of the M.C.I. It also recommended that a follow-up should be made after some time to evaluate how far these recommendations have been implemented.

During this period when many Conferences were recommending that didactic teaching should be reduced and group seminars, conferences, etc., be organized to develop original thinking and activate participation in the students, the Regional Office of the World Health Organization took the initiative by organizing Workshops in Teaching Methods in medical education from 15 November to 22 December 1965, at New Delhi, Varanasi, Hyderabad, and Baroda. Demonstrations were given in these workshops on teaching methods such as clinico-pathological conferences, integrated seminars, student integrated seminars, directed teaching, etc.

Under the sponsorship of U.S.A.I.D., Delhi, a regional Seminar on Social and Preventive Medicine was held at Trivandrum in May 1966. The main objective of the Seminar was to encourage interchange of ideas, and no recommendations were made at the Seminar as it was held at a short notice. A few points that emerged in the discussions included:

- (a) The necessity of a qualified statistician to take charge of various aspects of statistical work and training of students.

- (b) The necessity of practical research on the utility of various family planning methods.
- (c) The necessity of interchange of research data in medical colleges.
- (d) The usefulness of teaching certain aspects of biostatistics while doing experiments in physiology (for example during practicals on blood grouping to stimulate interest).

Another Seminar on the Teaching of P.S.M. was held in Ceylon in November 1966, organized by the regional office of the World Health Organization with the objective to improve the teaching of P.S.M. to undergraduates and to promote its integration with teaching of child health, medicine, and psychiatry.

The Third Conference of Deans and Principles of Medical Colleges in India was held from 29 to 30 August 1967, at New Delhi, to discuss family planning, undergraduate medical education, and post-graduate medical education.

Considering the urgent need for population control in the country and the need for motivating and instructing undergraduate medical students in family planning so that they can do field service in family planning, the Conference resolved that:

- (a) Emphasis be given to teaching of family planning in integration with all other subjects.
- (b) One month may be provided for training in the practice of family planning in the last year of clinical studies by utilizing about one week in each of the 4 major disciplines.
- (c) A question on family planning be included in the question papers and in practicals or other examinations in all subjects.
- (d) The departments of obstetrics and gynaecology, P.S.M. and paediatrics take the responsibilities of giving practical training in family planning methods during the period of internship.
- (e) Opportunities to do vasectomy, I.U.D. insertions, and tubectomy operations be provided during the internship

period in surgery and gynaecology.

- (f) Additional staff be provided in medical colleges to improve instruction in family planning.

Regarding undergraduate medical education the relevant resolutions passed included:

- (a) The functions of the medical college should consist of:
- (i) maintaining high standards of medical education and research,
 - (ii) providing education to orient the doctor to render service to the community and thereby help to improve the existing social conditions,
 - (iii) providing training of post-graduates,
 - (iv) providing refresher courses for general practitioners, and
 - (v) rendering health education.
- (b) In order to utilize to the full extent the limited time during M.B.B.S. course for study of several disciplines, it is resolved that each medical college appoint a committee composed of representatives of all faculties to draw up a balanced curriculum.
- (c) In planning the curriculum, due emphasis to be given to extra-curricular activities.
- (d) Operational research be conducted on the advantage and disadvantages of pre-medical education being conducted in medical colleges *vis-à-vis* the science colleges.
- (e) There is a need for orienting existing teachers in medical colleges to the social and preventive aspects of health care and community health.
- (f) In training medical teachers emphasis be given on services, training, and research, and workshops be organized in various colleges to train every teacher in medical colleges. Post-graduates may be trained by allowing them to teach undergraduates.
- (g) Health education and social sciences including psychological, sociological and anthropological studies be introduced as subjects in the undergraduate medical curriculum. Teaching of these subjects should be done by departments of P.S.M.

The W.H.O. study group on "Teaching of Social Sciences in the Medical Curriculum" met at Delhi from 12 to 14 December 1967 and deliberated on the need for teaching of social sciences in the medical curriculum. The Committee, while recognizing the need for teaching social sciences in the undergraduate curriculum in order to orient the student to the problems of the community, felt that further research and thinking was needed to work out the needed social sciences content to be taught.

In recognition of the need for a review of the on-going programmes of training in public health, the Union Minister of Health entrusted the N.I.H.A.E. in 1967 with the task of working out a pattern for Diploma Courses in the field of community health and revision of curriculum and content of D.P.H. courses. The Committee proposed and approved a questionnaire which was sent out in 1968 to collect the views of educationists from outside and within the country. The resources were analysed and placed before a Workshop on post-graduate education for community health work held at Delhi from 24 to 27 February 1969. The workshop was aimed at considering the needs for post-graduate education in community health for India, working out the details of the types of courses and the types of positions for which such training is needed, and examining whether the present available courses would meet the need for giving training to officers in community health.

The Workshop, after long discussions and consideration of health needs of the country, recommended:

- (a) There is a strong need to start orientation courses for all medical officers, giving knowledge of administrative practices of health service organizations, community health administration, mental and child health and family planning, nutrition, environmental education, extension education, statistics, etc. Refresher courses, which an officer should undergo at least once in five years to keep himself up-to-date with the trends in organization and management techniques, changing community needs and technological developments, should also be organised.
- (b) Staff College courses be started for senior officers to

prepare them to take leadership in health administration. The courses should lay emphasis on administration, coordination, attitudes, self-appraisal, decision-making, planning, evaluation, and supervision. Knowledge and skills may be developed in these areas.

- (c) The Diploma in Public Health courses may be moulded, or a separate diploma course in community health may be started for District level, State level, and Central health administrators and programme officers as well as the teachers of P.S.M. to provide knowledge on community health, skills on community diagnosis, and competence in administrative techniques.
- (d) A doctoral level degree in community health as an essential qualification is desirable for positions involving major administrative responsibility. The existing doctoral level programmes do not meet the needs of administrators with major responsibilities and it is, therefore, recommended that a new type of doctoral degree in community health is a need with emphasis on public administration, health economics, programme administration and planning, hospital administration, medical care administration, research methodology, action research, and operations research.

The Workshop also recommended that research and experiments with the curriculum should go on.

Following the recommendations the N.I.H.A.E. started M.D. courses in Community Health from September 1969. Staff College courses have also been started in N.I.H.A.E. for senior health administrators.

Noting the importance of teaching of social sciences to medical students, the Delhi branch of the Indian Association for the Advancement of Medical Education, in collaboration with the U.G.C., organized an Institute for teaching of Social Sciences in Medical Colleges from 6 to 11 October 1969 at Delhi. After much discussion and thinking the following recommendations emerged out of the Institute:

- (a) Social sciences should be taught in integration with other medical subjects.

- (b) All clinical departments should adopt a clinical psycho-social case approach.
- (c) Concepts from behavioural sciences and all other social science disciplines be included in the curriculum.
- (d) Manuals of teaching, a bibliography of related literature, short films, and programmed instruction material be prepared for teaching these subjects.
- (e) Interdisciplinary research with a community focus should be undertaken in medical colleges and the findings be integrated in teaching.
- (f) Social sciences be taught either by social scientists or by a medical teacher who has at least 3 months of orientation in an appropriate institute.
- (g) A clearing house of information about interdisciplinary research in the fields of health and social sciences be developed.
- (h) A Medico-Social Unit be set up in medical colleges.
- (i) Research be carried out by P.S.M. departments in collaboration with social scientists working in the health field and with the clinical teachers.

The recommendations centre mostly round the research and organizational aspects of teaching social sciences but not much has been concretely stated as to where this would fit in the curriculum and what specific concepts would contribute to the preparation of the basic doctor.

Meanwhile, another development took place from the side of the Government to improve the situation of medical education in India. In April 1968, the recommendations of the 1967 Conference of Deans and Principals of Medical Colleges were considered by the Executive Committee of the Central Council of Health, which recommended that there was a need to study all aspects of medical education in the light of national needs and resources. It directed that a committee should be appointed to consider the question of medical education in all aspects. Accordingly, the Government of India appointed a committee to (i) study all aspects of medical education and training of medical graduates in the light of national needs and resources and (ii) to consider the development of the undergraduate medical curriculum in relation to national requirements, the

need for uniformity of syllabus, apportioning of time between didactic and practical teaching, selection of entrants to medical colleges, reciprocity between various medical institutions and universities, and domiciliary restrictions in the matter of admission to medical colleges. The Committee submitted its report to the Central Council of Health which considered the report at its sixteenth meeting held in November 1969, and expressed its appreciation for the report and its approach for reorienting undergraduate medical education to turn out basic doctors who would be emotionally and professionally prepared to meet the needs of the community, particularly those of the rural areas. The recommendations submitted by the Committee were, *inter alia*, as follows :

- (a) The pre-medical courses should comprise the study of language, physics, chemistry, biology, basic mathematics in relation to physics, and social sciences.
- (b) The content of instructions for the pre-medical course be compressed for completion in one academic year rather than in 18 months as recommended by the Mudaliar Committee.
- (c) The curriculum for the pre-medical course should be drawn by the faculty of science in consultation with the faculty of medicine.
- (d) The medium of instruction should continue to be English.
- (e) The medical teaching and training should be oriented to producing a doctor who is conversant with the basic health problems of rural and urban communities and who is able to play an effective role in preventive and curative health services.
- (f) The teaching of P.S.M. should form an integral part of medical studies for the M.B.B.S. course and marks obtained in this discipline should be ranked with other disciplines for awarding the M.B.B.S. degree.
- (g) Teachers of preventive and social medicine should preferably have clinical experience.

Details of courses, content, and syllabi in various subjects have also been worked out by the Committee and recommendations made. With regard to the P.S.M. curriculum the

Committee recommended the following:

- (a) To serve as a background for the teaching of P.S.M. social sciences should be included in the pre-medical curriculum.
- (b) About 60 hours may be allocated during the pre-clinical course for the teaching of P.S.M. The curriculum for this period should include biostatistics, ecology of disease, demography, growth and development, nutrition, medical economics, sociology, and medical ethics.
- (c) About 340 hours be made available for instruction in P.S.M. during the 3 years of para-clinical and clinical courses.
- (d) Examinations should be conducted in P.S.M. as in the other subjects, during the pre-clinical period.
- (e) Semester type of examinations be organized at intervals of 18 months so that there will be 3 examinations in $4\frac{1}{2}$ years. The questions in these examinations should be of the objective type or of multiple choice.
- (f) Oral examinations be conducted in collaboration with the teachers of the departments of medicine, paediatrics and microbiology.
- (g) There should be about 160 hours of teaching this subject in the para-clinical period. During this period subjects such as environmental sanitation, elementary social sciences, nutrition, health education, medical entomology, industrial medicine, and epidemiology should be taught.
- (h) During the clinical period public health administration, maternal and child health, school health services, primary health centre, social security, family planning, vital statistics rehabilitation, and social medicine should be taught.

The recommendations were placed before a larger conference of medical educationists and educationists from all over India held on 6 and 7 July 1970, who considered the recommendations and offered comments for discussion.

Appendix I

UNDERGRADUATE MEDICAL CURRICULUM MEDICAL COUNCIL OF INDIA

(The portion dealing with preventive and social medicine is reproduced below.)

Adopted by the Medical Council of India on 22/27 November 1964.

Social and Preventive Medicine

The curriculum comprises the courses outlined in Appendix 'A' for Social and Preventive Medicine attached herewith, which gives the year to year work from the beginning of the students' course. The Universities can either have a separate paper in Social and Preventive Medicine along with Medicine or they can have a separate examination in Social and Preventive Medicine.

The curriculum detailed above including Social and Preventive Medicine should be adopted in full in all medical colleges with immediate effect and the report sent to the Council regarding the implementation of the same.

APPENDIX 'A'

Summary

(a) The Committee endorses the recommendations that the teaching of preventive and social medicine should take place throughout the teaching period.

(b) The Committee recommends that the standards to be followed by the department of preventive and social medicine in the medical colleges should be clearly spelled out for the benefit of the Universities, as has been done for certain pre-clinical and clinical subjects.

(c) Accordingly, the Committee recommends that in the pre-clinical period, a *minimum* of 50 hours be devoted to the teaching of preventive and social medicine.

(The details of the subjects to be taught have been briefly mentioned by the Committee.)

(d) The Committee recommends that one question on preventive and social medicine be included in the First Professional Examination.

(e) In the clinical period, the Committee recommends that 250 hours be devoted to the teaching of the subject. The details of the teaching recommended by the Committee are included in the report.

(f) The Committee recommends that during the student's attendance at various departments such as infectious diseases, T.B., leprosy, V.D., etc.,

(which is now required under medicine and surgery), emphasis should be laid as much on the preventive as on the clinical and therapeutic aspects of these diseases.

(g) The Committee recommends that in addition to the teaching undertaken by the departments of preventive and social medicine, a joint programme with other departments is essential in order to give the students a comprehensive picture of man, his health and illness.

(h) The Committee recommends that stress be laid on national programmes, including those of control of communicable diseases and family planning and health education.

(i) The Committee recommends that a separate examination in preventive and social medicine be undertaken in the third professional or final examination.

(j) The Committee recommends the establishment of an epidemiological unit as an integral part of every hospital in order to achieve a comprehensive study of disease by the students.

(k) The Committee feels that the objectives of the internship period should be clearly defined and that a proper training programme be organized for this period. The Committee has given the objectives and suggested methods by which the internship could be made into a much more satisfying and fruitful experience than at present. The Committee feels that this is one of the weakest links of the teaching programme and that there is an urgent need for planning in this phase of education.

(l) As regards the qualifications of the teachers, the Committee feels it highly important that all teachers in preventive and social medicine should have had adequate administrative experience in addition to the teaching experience. The Committee has, therefore, recommended a period of administrative experience which should be an essential qualification for all teachers of preventive and social medicine. In this connection, the Committee draws attention to the recommendations of the Health Survey and Planning Committee and the Bhore Committee regarding the qualifications of the teachers.

(m) The Committee reviewed the minimum standards of requirements for a department of preventive and social medicine, the accommodation required for the department of preventive and social medicine and equipment for the department and has made certain recommendations.

(n) The Committee has reviewed the standards required of a field area which should serve the department of preventive and social medicine. The Committee feels that the lack of definition for such a field area is a major omission and this matter should be rectified as soon as possible.

(o) The Committee has made certain recommendations regarding the standards, the staff and other matters that in their view are required for a field area which will serve the departments of preventive and social medicine and the other departments of the College.

The Committee has the following recommendations to make:

UNDERGRADUATE OR M.B.B.S. COURSE

Curriculum

1. *Pre-Clinical*

- (a) The present educational system requires those students intending to undertake medical studies to choose the science group of subjects. In order to prepare the students for professional concepts which are essential to the professional doctor as a citizen and as a practising physician in the community, the Committee feels that the element of humanities which has been omitted, should be added in the pre-clinical years. Hence it is imperative that the social aspects of medicine should be introduced as a separate subject along with other disciplines.
- (b) The Committee recommends that a minimum of 50 hours be devoted for preventive and social medicine in the pre-clinical period. The following subjects should form a part of the teaching of this discipline:
 - (i) Personal Hygiene
 - (ii) Bio-statistics and Vital Statistics
 - (iii) Human Ecology
 - (iv) Elementary Psychology
 - (v) Elementary Social Science
 - (vi) Normal Growth and Development
 - (vii) Nutrition and Dietetics

A number of these items could be undertaken in collaboration with the Departments of Physiology and Bio-chemistry and should form an integral part of their teaching.

- (c) The Committee emphasizes that the teaching of preventive and social medicine should be undertaken by the department of preventive and social medicine in co-ordination with other departments.
- (d) The Committee further recommends that there should be a separate examination question in preventive and social medicine in the first M.B.B.S. examination. This question should be based on the topics that are taught, and should be included in the examination papers in any one of the pre-clinical disciplines.

2. *Clinical - Preventive and Social Medicine*

The Committee recommends that the following may be included under the heading "Preventive and Social Medicine" appearing on page 4, item 4 of the Professional Education Recommendations of the Medical Council of India.

- (a) A course of systematic instruction in the principles and practices of preventive and social medicine which should extend throughout the period of study.
- (b) There should be a minimum of 250 hours in total for attendance of lectures, demonstrations, seminars, conferences, field visits and practicals during the clinical period.

The following subjects should be included in the teaching programme:

- (i) Medical statistics, including collection, tabulation, presentation and the interpretation of data, and the use of statistical methods.
 - (ii) Environmental hygiene, including man and his environment, occupational and industrial hygiene, village and town sanitation, bacteriology of water, milk, food and food hygiene.
 - (iii) Parasitology, helminthology and entomology in relation to communicable diseases, their prevention and control.
 - (iv) Principles of epidemiology.
 - (v) Communicable diseases, their prevention and control.
 - (vi) Public health administration, including the requirements of international health, social security, public health law, and the role of international and other health organisations.
 - (vii) Advanced courses of nutritional deficiencies.
 - (viii) Preventive and social medicine: Teaching should include clinico socio-pathological conferences with other departments, maternal and child health, the care of mothers and infants including family planning and school health, supervised field study activities.
- (c) In order that the discipline of preventive and social medicine is presented in its proper perspective, every effort should be made to co-ordinate the teaching programme of the department with the various departments of medicine, surgery, obstetrics and gynaecology etc. to give the student the correct and integrated approach to the practice of medicine.
- (d) To study disease in a comprehensive manner, it is essential that an epidemiological unit be set up in the outpatient department of the teaching hospital. Such an epidemiological unit will enable the students to understand the social, economic and environmental factors in relation to illness during his training period.
- (e) During the student's attendance at the following departments, as recommended by the Medical Council of India, vide "Professional Education, Recommendations of the Medical Council of India (Undergraduate Curriculum)" adopted by the Council, para IV clinical subjects, sub-para 5 and 6, instruction in the Preventive aspects should be emphasized during the study :
- (i) Acute infectious diseases and other local endemic diseases, for example, trachoma, goitre, filariasis, etc.
 - (ii) Tuberculosis.
 - (iii) Preventive aspects of psychological medicine and psychiatry.
 - (iv) Preventive aspects of leprosy.
 - (v) V. D. Control.
 - (vi) Preventive aspects of dietetics and nutrition information on all national health programmes and the role of international health organization should be given in order that the medical graduate

may participate in the successful implementation of these schemes during his career after graduation.

- (f) In order to make the students practise what is being taught it is absolutely necessary that the hospital where he works and the hostel where he resides should be involved alongwith the professors of the various disciplines of the hospital, and other authorities concerned, to take interest in environmental sanitation
- (g) Principles of health education including the education of hospital and health staff, patients and their relatives within the hospitals.
- (h) The medical students should be given at least 6 lecture-demonstrations on family planning at a Family Planning Centre attached to the medical college or at a recognized health centre during the regular course for undergraduate training either under the Department of Obstetrics and Gynaecology or Social and Preventive Medicine. The concept of family planning and population control should be emphasized by all disciplines.
- (i) Every student should be required to submit one satisfactory written history of a community health programme undertaken under the guidance of staff of the social and preventive medicine unit in a rural area and one written case history of a patient followed up with the assistance of the epidemiological unit, in co-ordination with the department concerned and the department of preventive and social medicine.

3. *Examinations*

- (a) The Committee recommends that there should be a separate examination in preventive and social medicine. The Committee recommends the following change vide Medical Council of India Memorandum "Professional Education" (undergraduate medical curriculum) adopted by the Council.
"On page 7, under item No. 4, III-Third Professional of final examination: Delete under III (i) 'a separate paper on preventive and social medicine and add 'IV (i) A separate examination in Preventive and Social Medicine - 50% written and 50% practical'."
- (b) The case histories and performance at the field training centre should also be taken into account for the purpose of assessment in the final examination.

4. *Rotating Housemanship - Rural Training*

The Committee feels it essential to outline the objectives to be achieved during the 3 months' rural stay in the housemanship period. The Committee would like to suggest the following as an outline of the objectives to be achieved:

- (a) Administrative aspects
- (b) Preventive aspects
- (c) Clinical aspects

(a) *Administrative Aspects*

- (i) Under administrative aspects, rural internship should serve to orient the student to the political structure and administration

of a rural area, and in the actual working of those organizations concerned with local self-governments namely zilla parishads, the panchayat samities and other facets of community development work.

- (ii) It should serve to orient the intern with the concept of team work with para-medical health workers, namely the health visitor, the vaccinator, the sanitary inspector, the social scientist and the health educator, especially in connection with national health programmes.
- (iii) It should orient the intern in the social dynamics of a community. This has an important bearing in health work. This should include the dynamics of leadership, the motivation of a community and the various important facets of influencing leaders in the promotion of health programmes. This is an integral part of the application of health education principles in the promotion of development work.
- (iv) It should serve to orient the doctors to the administrative aspects of various national health programmes that are an integral part of work at the primary health centres. These should primarily be programmes such as:
 - (a) The malaria eradication programme
 - (b) Small pox eradication programme
 - (c) Tuberculosis control
 - (d) Family planning
 - (e) Certain specific communicable diseases, such as filaria, leprosy, tracoma, V.D., etc.
- (v) It should serve to put the health programmes in the perspective of the overall national development programmes, namely, agriculture, education, social welfare, etc.

(b) *Preventive Aspects*

- (i) It should serve to orient the intern to the organization and management of a comprehensive health service for a community. This programme should invariably include the environment of the community.
- (ii) It should serve to orient the intern to the role of individual members of the health team and of important leaders in a community.
- (iii) It should serve to acquaint the doctor with the keeping of adequate statistical records and the interpretation of health indices.
- (iv) It should serve to orient the doctor towards the effective utilization of all resources in the community for promotion of health programmes.
- (v) It should serve to indicate that illness is an episode in the total framework of an individual's health. The need for adequate contact tracing and follow-up of sick patients after therapeutic treatment should be demonstrated to the maximum in a rural community.

- (vi) It should give an indication of the priority needed of various facets of health programmes, such as the importance of immunization, importance of school health programmes, importance of nutritional education, care of the pre-school child etc.
- (vii) The social effects of illness on an individual and family, and the results of socio-economic factors in causing illness should be demonstrated.
- (viii) The planning and evaluation of a community health service.

(c) *Clinical Aspects*

- (i) It should sharpen an individual's diagnostic capacity, so that he may be able to make use of his individual senses without dependence on expensive aids, such as laboratory, X-ray, etc.
- (ii) It should allow for an individual taking responsibility for minor illnesses and surgical complications.
- (iii) It should serve to indicate his limitations and realization of when to call for consultative services for a referral.

The methods by which this could be achieved:

- (i) A planned programme in order that all students should have an opportunity to meet villagers, be present at and participate in village meetings, especially those of the health committee. In order to effectively demonstrate the role of community leaders in a health programme, it should be the duty and responsibility of the staff of the rural field centre to form a health committee in every rural field training area.
- (ii) The role of other officials in the village, namely the teacher, the village level worker, etc. should also be demonstrated and the students should be given an opportunity to meet the block development officer and his staff, and to become familiar with the other development programmes in the village.
- (iii) Every effort be made to ensure that the hostels and the houses of the staff of the health centre, as well as the surroundings of the centre itself should be such that minimum facilities, such as protected and safe water, latrines, etc., are provided. Wherever possible, the students should be made to live in the village, but under hygienic conditions which can be reproduced by the villager.
- (iv) The students should have an opportunity of visiting and being shown the various national health programmes. For this purposes, the staff of the rural field training area should be in liaison with the staff of the various national health programmes.
- (v) It should be ensured that the primary health centre is supplied with adequate vaccines and sera and modern drugs.
- (vi) The administrative aspects of running primary health centres should be demonstrated to the students, and they may be allowed to make suggestions in such matters, as the purchase of drugs, the type of basic equipment, the cost of the diet, etc., and how the centre funds

could be utilized.

- (vii) The students should have every opportunity of working with the health centre staff and visiting their homes. The principles of health education and of approach to a community and to an individual should also be effectively demonstrated to them and the students be required to practise this under skilled supervision.
- (viii) To effectively implement the above requirements the staff of the field training area be adequate in number, be properly trained, and have the facilities to undertake the teaching and training that is required.

SCHEDULE OF TEACHING PREVENTIVE AND SOCIAL MEDICINE FOR UNDERGRADUATE STUDIES IN MEDICAL COLLEGES

Pre-clinical Period – 16 Months Hours available – 30

Subject	Didactic Lectures (Hours)	Visits	Practicals/Dis- cussions/ Classes/ Seminars
1	2	3	4
A. Orientation Courses:			
1. Introductory Lectures	6	—	—
– History of growth of understanding of disease causation			
– Concepts of preventive and social medicine			
– Graded concepts of health and disease			
2. Genetics	4		
– Heredity and Health Concepts of Heredity—Mechanism of Heredity			
– Transmission of normal characteristics in man			
– Public health implication of heredity and prevention of hereditary diseases			
3. Normal Growth and Development	3		
– Concepts of normality, deviation from normal			
– Dimensions of growth—physical, intellectual, emotional and sexual			

1	2	3	4
- Life cycle of man - infant, toddler, school going, adolescent, adult and normal aging			
B. Applied Courses:			
1. Bio-statistics	8	—	4
- Introduction to biostatistics			
- Collection, tabulation and presentation of data			
- Variation, frequency, normal and skewed curves			
- Single figures to represent mass data - mean, mode and median			
- Measures of dispersion from mean			
- Range, standard deviation and standard error			
- Variability of observations			
- Tests of significance			
2. Introduction to psychology	6	Child guidance clinics - 4 hours	
- Definitions, scope, methods and branches of psychology			
- Consciousness, mental development, intelligence, personality			
- Abnormal mind			
- Disintegration and diseases of personality, insanity, etc.			
- Social psychology, socialisation, international influences, role and role conflict, inter-group tension and prejudices			
3. Introduction to sociology	6		
- Definitions - society, community, family, etc.			
- Social organization			
- Social institutions - courtship, marriage, divorce, etc.			
- Culture - variability			
- Culture and health practices			
- Social change			
4. Personal hygiene through different periods of life	4	Discussions - 5 hours	

Clinical Period - 3 Years

Subject	Didactic lectures (hours)	Visits		Practicals
		Place of visit	hours	
1	2	3	4	5
1. Man and environment	20			
- Concept of ecology				
- Climate and health				
- Air, ventilation and atmospheric pollution				
- Water supply - rural and urban		Water works	2	
- Excreta disposal - rural and urban		Sewage disposal works	2	
- Housing and Health		Field surveys in rural and urban areas	2	
- Village and town planning				
- Occupation and health, industrial hygiene, diseases and accidents		Visit to a factory, village, and town planning organization	4	
- Rat and insect control	4			
2. Nutrition	15			
- Nutritive value of some commonly used food stuffs in India				4(E)
- Diets - balanced and ill-balanced				1(E)
- Diets - according to various physiological needs; diets in certain diseases				
- Deficiency diseases				
- Diseases transmitted by food and food poisoning				
3. Medical statistics	10			4(E)
- Need for vital and health statistics				
- Vital health statistics in India				
- Registration of birth and deaths and notification of communicable diseases in India				

1	2	3	4	5
- Rates and ratio relating to nationality, mortality and morbidity				
- Standardised death rates				
- Life tables				
4. Integrated teaching				10(S)
5. Introduction to epidemiology	3			5(D)
- Definition and purpose				
6. Epidemiology (contd.)	6			
Natural history of disease and levels of prevention				
- Illustration in relation to a few simple diseases				
- Communicable diseases-prevention and control	25			
- Investigation of an epidemic				
- Mechanism of transmission				
- Immunity and resistance				
- Prevention of small pox, chicken pox, measles, diphtheria, leprosy, tuberculosis, malaria, filaria, intestinal parasites, cholera, typhoid, dysenteries, plague, tetanus, treponemal diseases, rickettsiasis and typhus, arthropod-borne and other viral diseases				
8. Preventive aspects of non-communicable diseases	4			
9. Demography and Family Planning	6			
10. Preventive medicine	6			
- Periodical health examination				12(S)
- Immunization programmes				
- Prevention of long-term illnesses				
Geriatric-rehabilitation				
11. Integrated teaching				10(S)
12. Social Medicine	6			9(B)
- Definition				
- Social aetiology				
- Social pathology				

1	2	3	4	5
- Social therapy and rehabilitation		Visit to rehabilitation centres and after-care homes for women		
13. Applied aspect of genetics	3			
14. Medical care	12			
- Hospital				
- Polyclinics and health centres - health team				
- The role of general practitioner, medical practitioner records				
- Comprehensive medical care				
- Voluntary health organization				
- Medico-social work				
15. Public Health Administration	12			
- International, Central and state health administration				
- Local Health Services		Municipal Corporation Primary Health Centre	4	
- Community Development and National Extension Service Programmes, Health centre				
- Personal health services				12(S)
- Health legislation in India	2			
16. Health education	2			10(S)
17. Integrated Teaching				6(D)
18. Revision				9

Practicals include the following: (D) Discussion classes
(E) Exercises
(F) Film show
(S) Seminars.

Breakdown of Hours:	Lectures	Visits	Practicals/ Seminars	Total
Pre-clinical period	37	4	9	50
Clinical period	129	29	92	250
Total	166	33	101	300

Appendix II

UNDERGRADUATE MEDICAL CURRICULUM (1965 – 1966) OF THE DEPARTMENT OF PREVENTIVE AND SOCIAL MEDICINE, ALL INDIA INSTITUTE OF MEDICAL SCIENCES

COURSE ON NORMAL GROWTH AND DEVELOPMENT

First Semester (July – December)

1. Description of the course in preventive medicine
2. Relationship of preventive medicine to clinical medicine
3. Introduction—meaning of “normal” and variables of normal
4. Milestones of physical growth
5. Growth of organs and systems
6. Factors governing growth and development
7. Emotional development – Oral period (6 – 9 months)
8. Emotional development – Anal period (6 months to 3 years)
9. Emotional development – Phallic period (3 to 5 years)
10. Emotional development – Latency period (5 to 12 years)
11. Emotional maturity and the adult (adult roles)
12. Emotional development – puberty and adolescence
13. Menopausal era, senescence
14. Sexual development as it is related to physical growth
15. Personality formation
16. Summary session
17. Review of personal health records
18. Review of personal health records
19. End of semester test – written
20. End of semester test – oral

COURSE ON PERSONAL HYGIENE

Second Semester (January – June)

1. Introduction
2. Individual adjustment to environment
3. Personal hygiene at different periods of life, the formation of habit
4. Sex education
5. Sex education (film)
6. Dental and oral hygiene
7. Value of physical exercise – posture and its bearing on health
8. Clothing and health
9. Relationship of air and light to health
10. Effects of heat, cold and altitudes
11. Nutritional problem in India
12. Diet constituents and balanced diet
13. Assessment of nutrition status and diet surveys

14. Education in nutrition
15. Review of the student's personal health records
16. Department test

COURSE ON SOCIAL SCIENCES

Third Semester (July – December)

1. What is social medicine
2. Man as a social being
3. Social forces as they apply to the patient
4. The relationship of the social and physical environment
5. Summary of relationship of the social sciences to medicine
6. Patterns of village life. Influence of joint family
7. Mores, customs, taboos and marriage customs
8. Influence of religion – religious and civil law
9. Social anthropology
10. Effect of urbanisation and industrialisation on modern Indian society
11. Why organized government – political ideologies
12. End of semester test – written
13. End of semester test – oral
14. Review of students' personal health records
15. Review of students' personal health records

COURSE ON ENVIRONMENTAL SANITATION & BIOSTATISTICS

Fourth Semester (January – June)

Course on Environmental Sanitation

1. Principles of environmental sanitation and the present state of environmental sanitation in India
2. Urban water supplies
3. Rural water supplies and water supplies in the field
4. Disposal of sewage
5. Disposal of refuse
6. Housing and health
7. Principles of food sanitation and inspection of food
8. Diseases conveyed by insects of medical importance and general characteristics of insects
9. Control measures for insects of medical importance

Course on Biostatistics

1. Introduction to statistics, collection of statistics and tabulation of data including census
2. Presentation of statistics
3. Averages
4. Variations and standardisation

5. Rates and ratios
6. Vital statistics – national and local
7. Use of international classification of diseases
8. Review of environmental sanitation
9. Review of statistics
10. End of semester test

Field Visits

1. Public water supplies
2. Sewage disposal plant
3. Rural community development
4. Dairy plant

Statistics : Practical

1. Presentation of statistics
2. Averages
3. Variations
4. Rates and ratios
5. International classification of diseases

COURSE ON PUBLIC HEALTH ADMINISTRATION

Fifth Semester (July – December)

1. Team concept in health service – public health physician, lady medical officer, public health nurse, medico-social worker, sanitation, lab. technician and health educator
2. Evolution of health services
3. Decentralization of health services
4. Municipal health service – local health department of towns and cities
5. State and National Health Services
6. Community development block in relation to rural health services
7. The three Five Year Plans – broad outline
8. Our national aspirations and their relation to health
9. Public health law in relation to medical practice
10. International health agencies
11. Voluntary health and social welfare agencies in India
12. Maternal health care
13. Infant health care
14. Care of pre-school child
15. Care of school child
16. Population problem
17. History of family planning movement in India
18. Methods of family planning
19. National family planning programme
20. End of semester test

Field Visits

1. Rural health centre and community development block
2. Central health education bureau
3. Maternity and child health centre
4. Bharat Sevak Samaj
5. Visit to family planning clinic
6. Visit to family planning clinic
7. Visit to family planning clinic

COURSE ON EPIDEMIOLOGY AND NATURAL HISTORY OF DISEASE

Sixth Semester (January – June)

1. Evolution of epidemiology
2. Scope of epidemiology
3. Definitions and terms used in epidemiology
4. Natural history of disease
5. Epidemiology and control of malaria
6. Epidemiology of tuberculosis
7. Control of tuberculosis
8. Epidemiology and control of syphilis
9. Epidemiology and control of diphtheria
10. Epidemiology and control of poliomyelitis
11. Epidemiology and control of smallpox
12. Epidemiology and control of food poisoning
13. Epidemiology and control of cholera
14. Epidemiology and control of filaria
15. Epidemiology and control of leprosy
16. Epidemiology and control of a non-infectious disease – malnutrition
17. Epidemiology and control of atherosclerosis and cancer
18. Revision
19. Revision

COURSE ON INDUSTRIAL MEDICINE

Sixth Semester (January – June)

1. Evolution of industrial medicine concept
2. Scope of present day industrial medical services
3. Organizing industrial medical services for big industry (industrial city)
4. Organizing industrial medical services for small scale industrial estates
5. Problems of sanitation in industry
6. Industrial hazards and their prevention
7. Accidents in industry and their prevention
8. Industrial psychology
9. Rehabilitation and industry
10. Industrial medical officer's relation with community agencies

Field Visits

1. Planned and unplanned industrial areas to point out hazards of unplanned growth to the neighbouring community
2. Visit to a foundry and a forging shop
3. Visit to a pottery
4. Visit to a cotton mill
5. Visit to a lead accumulator factory.

TRAINING IN COMMUNITY MEDICINE**(A) Clinico Social Case Review (During 5th and 6th Semesters)**

Suitable cases are selected from hospital inpatients and outpatients departments and are allotted to students in the 5th and 6th semesters. The students study the cases in detail in the hospital and by visits to their homes and then present their findings in a session attended by the students and teachers from the Department of Preventive and Social Medicine. Social and preventive aspects of disease are brought out in such sessions.

(B) Family Health Advisory Programme (During 7th and 8th Semesters)

During 7th and 8th semesters, 148 families, living in the Institute campus and covered by Employees Health Service Scheme, have been selected for intensive study and follow up by the senior clinical students i.e. 7th and 8th semesters. Each student has three families allotted to him/her. These students work in cooperation with Employees Health Service and under the supervision of supervisors from the Department of Preventive and Social Medicine. Each student discusses his experiences with his/her supervisor once a month, while the programme as a whole is evaluated every 3 months in a staff conference.

(C) Communicable Diseases (During 7th and 8th Semesters)

The Department of Preventive and Social Medicine cooperates with other clinical and para-clinical departments in conducting an integrated course in communicable diseases in the 7th and 8th semesters.

(D) Rural Internship Training Programme

The practice of internship varies from time to time. The following provides the content of the internship programme followed since 1966-67. It envisages dividing the interns into sub-groups (ABCD) and rotating them in the three areas Ballabgarh, Kurali and Dyalpur. Prior to their working in PHCs they were to attend the following seminars:

1. Organization of Health Services for Rural Population.
2. Role of Statistics in the Planning of Health Programmes.
3. Leadership pattern and community organization for successful public health programme.
4. Importance of para-medical and auxiliary staff in medical services.

5. Concept and practice of social pediatrics in a rural area.
6. Social and cultural aspects of M.C.H. services including social obstetrics.
7. Role of a doctor in a primary health centre in the National Health Programmes.
8. 9 & 10. Planning and organization of health services in a referral hospital to meet the needs of a rural community
 - (i) General principles
 - (ii) Medical and surgical services
 - (iii) Obst. & Gyne. services and Family Planning Services

Recently the practice has been changed. The interns spend the first month at Ballabgarh where there is a 50-bed referral hospital. They stay during the second month at Dyalpur PHC under the supervision of the M.O. and the staff. During their last month of the 3-month period, they work on their own as M.O. PHC at Chhansa PHC. The idea is to gradually equip the interns with the requirements of rural setting, from working under supervision to work on their own. It is also being considered whether the period of rural internship should be changed from three months to six months.

Appendix III

POST-GRADUATE TEACHING CURRICULUM (1969-1970) LEADING TO DEGREE OF DOCTOR OF MEDICINE IN PSM (ALL INDIA INSTITUTE OF MEDICAL SCIENCES)

FIRST YEAR

First Semester (July to December)

(a) Epidemiology

Principles

Introduction: changing concepts and uses of epidemiology

Types of epidemiology

Concept of health and disease

Cause and effect relationship

Descriptive epidemiology

(i) Variable of age, sex and marital status

(ii) Variable of occupation, education and social class

(iii) Variable of economic status and religion

(iv) Variable of time

(v) Variable of place

Classification of diseases and deaths

Sources of morbidity and mortality data

Measurement of disease frequency

Formulation and testing of hypothesis

(b) Biostatistics

Vital and Health Statistics & Statistical Methods in Public Health

Introduction: Place of vital and health statistics in field of public health – definitions

System of collection of needed data – population census – registration of vital events – attempts of improvement of present vital registration system

Measurement of mortality – commonly used measures – descriptive account of differential mortality

Incidence and prevalence – measurement of morbidity – sources of morbidity data

Sampling in Public Health – Problems arising at the stage of planning a sample survey – Types of sampling – problems at the execution stage – Evaluation in Public Health,

Prospective and retrospective studies and follow-up studies

Clinical and prophylactic trials.

(c) Social Sciences

(i) Introduction

The relevance of social sciences to medicine

Historical development of medical sociology
 Introducing the social sciences,
 Definitions and concept of Society and Culture.
 Man in perspective—physical and cultural anthropology.

(ii) *The Family*

Socialization of the child
 Types of families
 The growth cycle of families
 Problems of adjustment to a rapidly changing society viz., Industrialization and Urbanization, Marital mal-adjustment, Impact of sickness on family.

(iii) *The Community*

Structure and function
 Leadership pattern and power structure
 Religion – Religious beliefs and practices. Their impact on health.
 Group dynamics.

(iv) *Social Stratification*

Caste and class. Their epidemiological implications.

(v) *Social Change*

Social evolution and Social mobility
 The problems of rapid social change, especially, Urbanization and Industrialization.
 The strategy of social change. Education (mass communication media)
 Incentive
 Compulsion
 Legislation
 Community organization,

(d) **Growth and Development**

Maturation cycle – dealing with growth as a continuing process from conception to maturity Normal growth and deviation. Importance of this knowledge
 Factors influencing growth and development
 Heredity and environment
 Genes and chromosomes, inheritance
 Eugenic and genetic counselling
 Patterns of normal growth and development – physical, emotional, social
 Physical and motor development
 Role of nutrition in growth and development
 Emotional and psychological development (introduction)
 Language development
 Emotional development
 Mental development
 Social and moral development
 Puberty and adolescence and problems

Old age and problems

Socialisation cycle including social aspects affecting growth and development

Effect of rural and urban life on growth and development

Living standards, and housing in relation to growth and development

Various Indian institutions like marriage, family, caste. Mores and taboos producing an impact on man's mental, social and physical growth and development

Methods of child rearing as related to growth and development

(e) Environmental Sanitation

Introduction: The environment and diseases

Water supply and treatment, stream pollution

Refuse disposal – definitions, methods, sanitary land fill

Housing regulations

Insect control – insects of medical importance and their control

Rodent control – problem and control

Radiation – introduction, protection and disposal of waste

Mela sanitation

Food sanitation – catering establishments

Milk sanitation

Industrial sanitation including disposal of waste effluents

Air Pollution

Aerospace medicine – high altitude, aviation and aerospace

Legislation and Environment viz., local laws, W.H.O.

Internal quarantine.

(f) Note : In addition, the students will also:

Attend undergraduate classes

Conduct family health advisory service as assigned

Attend only interesting and/or assigned grand rounds, laboratory services

Prepare, present and finalise subject for their theses

Attend sessions of Journal Club and book reviews.

Second Semester (January to May)

(a) Applied Aspects of Epidemiology

Analytic Epidemiology

(i) Prospective studies

Whole population studies

Special population studies

Selection of control population

Analysis and interpretation of data

(ii) Retrospective studies

Selection of control population

Analysis and interpretation

(iii) Experimental epidemiology

Uncontrolled experiments

Controlled experiments

- (iv) Epidemiology of an acute infectious disease i.e. smallpox, cholera, typhoid, infectious hepatitis.
- (v) Epidemiology of a chronic communicable disease i.e. syphilis, tuberculosis, leprosy, filariasis, etc.
- (vi) Epidemiology of non-infectious disease i.e. cancer (lung), coronary heart disease, diabetes, cancer (breast), Rh. heart disease
- (vii) Epidemiology of non-disease entity i.e. malnutrition, accidents, suicides
- (viii) Planning a field survey (example, prevalence of diabetes)
- (ix) Planning a clinical trial (example, oral typhoid vaccine trial)
- (x) How to investigate an epidemic

Practicals 1. Exercises with built-in questions to train students in concepts and methodology will be discussed.

- 2. Review of certain classics in epidemiology viz., show on cholera will be discussed in the class

(b) Biostatistics**Principles of Biostatistics**

Introduction – aim and scope – statistics and scientific methods – definitions

Collection and data – basic ideas of “selection” in different situation – need for comparability of groups in comparative experiments

Presentation of data – graphs and charts

Presentation of data – frequency distributions – univariate and bivariate cases – construction of frequency distribution – types of frequency distributions

Descriptive statistics – measures of dispersion or variation – range, standard deviation, coefficient of variation

Normal distribution and its place in statistics – binomial distribution

Elementary introduction to the theory of probability – probability distribution

Elementary account of sampling theory – large and small samples – applications of the study of variation – standard error

Statistical inference – problem of estimation – confidence testing of hypotheses – commonly used tests of significance – standard normal variate, students’ t-test

Elementary concept of linear correlation and regression.

(c) Social Sciences**(i) Social stress and social problems**

Deviant behaviour: Delinquency

Crime

Suicide

Alcoholism

Drug addiction

The psychopathic personality

Behaviour of individuals in health and disease – the sickness role
Social aspects of illness, examples:

V.D. Tuberculosis

V.D. Malnutrition

Ch. Disease

Mental health and mental disease

Hereditary disease – some implications for society.

(ii) *Slums Social Welfare and Social Services*

Social welfare and social security in India—comparison with some other countries

Social case-work

Hospital – its social structure and role in the community

Rehabilitation

Health Insurance, C.H.S. and E.S.I.

Social & Welfare Legislations

(iii) *Research Methodology in Social Sciences*

Important steps of the research process

Research design Exploratory, descriptive and casual studies

Data collection. Interviews and questionnaires

Operational research

(iv) *Conclusions and future prospects.*

(d) **Public Health Nutrition**

The Normal Diet

Proteins II

Carbohydrates and lipids

The Vitamins

The Minerals

Nutrition and national development

Special dietary situations

Assessment of Dietetic and Nutritional Status

Supplementation and fortification

Hospital Dietetics

Diet and Cardio-Vascular Disease

Emergency Feeding

The Applied Nutrition Programme

Food Legislation

Recent Advances in Public Health Nutrition

(e) **Course in Clinico-Social Case Review**

Introduction to clinical social case review

Natural history of disease

Levels of prevention of disease in general

Comprehensive medical care for an individual patient

Concept of integrated team approach; situational utilization of various para-medical workers

Introduction to Medical Social Work in Public Health Team; Role of M.S.W.

Social case history taking

Art of interviewing

Class demonstration about art of interviewing

Psycho-social, and cultural aspects of illness

Health education and role of health educator

Importance of public health nurse and role of P.H.N.

Overall review of the methodology of C.S.C.R.

Allotment of cases from wards and demonstration on the case

Clinical history taking

Clinical history taking by students, physical systemic examination of the patient.

Laboratory investigation

Home visits

Discussion of cases

(f) **Note:** In addition students also attend

Undergraduate classes

Conduct F.H.A.S. for undergraduate students

Do field work on theses

Attend sessions on Journal Club and book review.

SECOND YEAR

Third Semester (July to December)

(a) Population Dynamics

(i) Demography

Introduction to demography. Theory of demographic transition and Malthusian theory

Survey of world population with special references to India

General determinants of fertility and mortality and their effect on population size and structure

Demographic study of Indian population growth

Basic definitions and measures of fertility and mortality indices

A glimpse on various demographic studies done in India with special reference to differential fertility

K.A.P. studies, discussion of survey and research methodology in social sciences with special reference to family planning

Use and effectiveness of various contraceptive methods

Test

(ii) Organization and administration of Family Planning Programme

Programme planning, organizational structure, implementation, budgeting at National, state and local level

Target setting and evaluation

Records and record helping in family planning programme

Value of demonstrations, experiments and pilot projects. Findings

of Gandhigram, Lucknow and Mehrauli Projects
Test

(b) Public Health Administration

Background and development of Public Health Admn. in India

Trends in Public Health Administration

Organizational principles

Generalization and specialization in public health services

Vertical or specialized services

Socialization of health services

1. C.G.H.S

2. E.S.I.

3. N.H.S. or U.K.

4. Medicare

Role of international and voluntary organization in public health services

Public Health Legislation

Economics of public health services

Planning and public health programme with specific examples to illustrate the organizational principles

Evaluation of a programme

Role of social medicine in hospital practice

Constitution of India and its relation to public health and social welfare

Concepts of international health

Decentralization and Regionalization

(c) Course in Maternal and Child Health

1. History of development of health services for mothers and children

2. Organization of health services for mothers and children

3. Trends in health services for mothers and children

4. Maternal health

5. Pregnancy

6. New born or premature infant

7. Health problems of infants and pre-school children

8. The well child conference

9. School health programme

10. Health services for handicapped children

11. Special services for children

(d) Course in Medical Care Administration

1. Concepts and Principles

Definitions and scope of medical care services

Concepts and principles in relation to medical care

(a) as related to family

(b) as related to a community

2. Organization of Services

Purpose and general principles organization

Scalar principle

Practical session

Staff and line relationship

3. Planning
4. Management and control
5. Evaluation
6. Techniques used in the administration of outstanding problems and issues
 - (a) International Trends
 - (b) National Trends

e) Occupational Medicine

1. Introduction
2. General principles and components
3. Components of industrial medicine
4. The Industrial Medicine Team and its role
5. Industrial toxicology – general principles
6. The organic solvents
7. The metallic poisons
8. Prevention of industrial poisoning
9. The premocomasic
10. The premocomasic
11. Industrial Accidents
12. Contact dermatitis
13. Noise
14. E.S.I. Scheme
15. E.S.I. Scheme
16. Assessment

Note: Seminars and discussions will predominate

1. 2 Field visits with undergraduate students
2. 4 Factory visits within Ballabgarh area
3. Possibility of field trip to industrial area

(f) Pedagogy

1. Introduction of Pedagogy
2. Problem of selection of students
3. Process of learning
 - { Student learns
 - { Teacher teaches
4. Tools of Instruction
 - { Techniques of instructions
 - { Materials of instructions
5. Evaluation of learning
 - { Techniques to measure knowledge
 - { Techniques to measure performance
 - { Techniques to measure attitudes
 - { Grades and grading

g) **Health Education**

1. What is health education
2. Health Education – the objectives and methods
3. Principles of planning health education
4. Evaluation of health education components in public health programmes
5. Organization of health education programme at Central, State and Local levels
6. Methods and materials used in health education
7. Health education as applied to case studies

h) **Note :** In addition students will

- (i) Present Seminars
- (ii) Attend Journal Club/Block Review
- (iii) Participate in undergraduate teaching
- (iv) Present work done in theses

*Fourth Semester (January – May)*a) **Population Dynamics**(i) *Contraception*

Review of anatomy and physiology of reproduction

Medical contraception through ages

Methods of contraception

Conventional and rhythm

I.U.C.D.

Oral contraception

Sterilizations (Male & Female)

Recent researches and further research needs of the contraception Test

(ii) *Family Planning*

(a) Family Planning in India – a review of failures and achievements and future trends

(b) Indices required in planning and assessment of family planning programmes

(c) Organization and administration of family planning programme in India, duties and role specification various personnel

(d) Psycho-social factors in acceptance of family planning

(e) Role of communication media and their practical use in family planning

(f) Role of physicians in family planning, their training and inclusion of family planning course in medical education

(g) Cost of family planning programme in India

(h) How to set up and guide a field training for evaluation of family planning work at National and Local levels

(iii) *Assignments*

Posting in Family Planning clinic administration

Records and report

Screening for orals, diaphragm and I.U.C.D.

Observation and actual doing of 2 vasectomies per student

Follow-up of complicated vasectomy cases (group project)

(b) Public Health Administration (National Programmes)

National Malaria Eradication Programme

National Trachoma Control Programme

National Smallpox Eradication Programme

National Water Supply and Sanitation Programme

Cholera Control Programme

National Filaria Control Programme

National Family Planning Programme

V.D. Control Programme

National Tuberculosis Control Programme

Applied Nutrition Programme

Goitre Control Programme

National Leprosy Control Programme

Mid-day Lunch Programme

(c) School Health

Introduction to course

Healthful school living

Health needs with special emphasis on nutritional requirement of school population

School health education

School health services

Screening procedures

Records and follow-up

Care for emergency sickness injury

Communicable disease – prevention and control

Mid Semester Test

Health aspects of physical education and care of athletes

A health programme for the handicapped

Patterns of school health administration

Qualifications of health personnel in school health work

Current status of school health service in India – Reasons for lag. Feasible recommendations for improvement

Field visits

Visit to school medical scheme

Visit to Patel Nagar School medical scheme

Visit to Modern School, Humayun Road

Presentation of reports on the 3 field visits

Final test

(d) Rehabilitation

Introduction

Evaluation of the patient
 Sociological and psycho-social adjustment to handicaps
 Physical Medicine
 Occupational therapy
 Speech therapy and hearing
 Prosthetics and orthotics
 Vocational assessment, guidance and placement
 Role of State and community
 National Rehabilitation Programme
 Voluntary agencies
 Role of the physician

Practicals:

Demonstration of rehabilitation facilities
 Demonstration of patient evaluation
 Demonstration of techniques of electrodiagnostics
 Demonstration of physical therapy modalities
 Demonstration of a completed case
 Field visit

- (e) Note: In addition students
 Present progress on their theses
 Participate in undergraduate teaching
 Participate in Journal Club and book review presentations.

Third Year: First Semester

1. Analysis, write up and submission of thesis
2. Posting in Rural Field Training Centre (6-12 weeks)
 Training is designed to include:
 - (a) Observation and participation in the administration, research and training activities of the Centre
 - (b) Assignment to investigate some public health problem under preceptorship
 - (c) Participation in some survey
 - (d) Participation in some mass programme, viz., control of communicable diseases
 - (e) Participation in the family planning activities of the area

Second Semester

1. Field attachment with Municipal Corporation, Delhi (1-2 weeks)
2. Field attachment with National Institute of Communicable Diseases (1 week)
3. Field attachment with C.B.H.I. (3 days)
4. Field attachment with C.H.E.B. (3 days)
5. Field attachment for visit to industries around and outside Delhi (2 weeks)

In this semester students mainly prepare for their examination.